Canadian Weed Science Society • Société canadienne de malherbologie

61st Annual Meeting
November 27th-29th, 2007

61ième Réunion annuelle
27 au 29 novembre 2007

Fairmont Tremblant Hotel

Mont Tremblant
Québec

Société canadienne de malherbologie
Canadian Weed Science Society

61ième Réunion annuelle / 61st Annual Meeting

Du 27 au 29 novembre 2007 / November 27 - 29 2007

Fairmont Tremblant, Mont-Tremblant, QC

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Canadian Weed Science Society
Société canadienne de malherbologie

Proceedings of the 2007 National Meeting

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Compiled, assembled and produced by
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Past proceedings are available to CWSS-SCM members on our web site at www.cwss-scm.ca.

Canadian Weed Science Society
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(CWSS-SCM)

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Introduction

Canadian Weed Science Society
Société canadienne de malherbologie
2007 Annual Meeting
Réunion annuelle 2007
Mont Tremblant, QC

There were 202 registered participants at the meeting and two symposia took place: Physical weed control: Progress and challenges and Common ragweed: An agricultural and urban weed.

The 2007 Awards and Scholarships recipients were:

Monsanto Scholarship:
Ph.D.: Christian Willenborg, University of Manitoba. Supervisor: Dr. Rene Van Acker
M.Sc.: Amélie Bilodeau, Université Laval. Supervisor: Dr. Gilles Leroux

Dow Agrosciences Travel Awards:
Ph.D.: Eric Page. University of Guelph. Supervisor: Dr. Clarence Swanton
M.Sc.: Kristina Polziehn, University of Alberta. Supervisors: Drs. Linda Hall and Neil Harker.

Syngenta Crop Protection Travel Awards:
Ph.D.: Amit Jhala. University of Alberta. Supervisor: Dr. Linda Hall
M.Sc.: Heather Flood. University of Manitoba. Supervisor: Dr. Martin Entz

Dow AgroSciences Excellence in Weed Science Award
The 2007 winner is Dr. Suzanne Warwick, Research Scientist at the Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada in Ottawa, Ontario.

Bayer CropScience Best Student Presentation Award
The Bayer CropScience Best Student Presentation Award was awarded to Christian Willenborg, University of Manitoba in Winnipeg, for his presentation titled "Can crop height and density be used to reduce flowering synchrony and intraspecific gene flow between cropped and volunteer wheat (Triticum aestivum L.)?

BASF Canada Best Poster Award
First Place:
Spatial variation in tillage practices across the prairies.
J.Y. Leeson and A.G. Thomas, AAFC, Saskatoon

CWSS-SCM Fellows

A new Fellowship award was initiated this year to honour members of CWSS-SCM who have made outstanding contributions to weed science and to the CWSS-SCM throughout their careers.

Four persons were made Fellow of the Canadian Weed Science Society - Société canadienne de malherbologie this year:

Dr. Paul B. Cavers
Dr. Allan S. Hamill
Dr. Jerry A. Ivany
Dr. Susan E. Weaver

E.I. DuPont Canada Photo Contest Winners

Brent Wright was the Photo contest chair for 2007.
Winners in Mont Tremblant were as follows:

General agriculture:
1) Rick Holm - Prairie Sky
2) Christie Stewart - Urban Agriculture
3) Christy Shropshire - Sunrise in cornfield

Weeds:
1) Marie-Josée Simard - Chicory Dance
2) Rob Nurse - Milkweed
3) Peter Smith - Waterlogged and loving it

Weeds in action:
1) Christy Shropshire - Blowing in the wind
2) Peter Smith - Weathering Heights
3) Glen Forster - Surviving in the Sand

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CWSS-SCM 2007 Annual Meeting Agenda

Date	Time	Topic
Monday November 26th	9:00 – 17:00	Board of Directors Meeting. Lunch served at noon
	16:00 – 20:00	Registration
	16:00 – 20:00	Poster and Commercial Display Setup
	18:00 – 20:00	Graduate Students meet the CWSS–SCM Board
Tuesday November 27th	7:30 – 8:30	Poster and Commercial Displays (author in attendance) – Continental Breakfast
	7:00 – 16:00	Registration
	8:30 – 16:00	Poster and Commercial Display Viewing
	8:45 – 10:10	Physical Weed Control: Progress and Challenges Symposium
	10:10 – 10:40	Health Break
	10:40 – 12:00	Physical Weed Control: Progress and Challenges Symposium (continued)
	12:00 – 13:15	Lunch
	13:15 – 15:35	Physical Weed Control: Progress and Challenges Symposium (continued)
	15:35 – 16:00	Health Break
	16:00 – 18:00	Section 1A – Soybean, corn, and edible beans
	16:00 – 17:15	Section 1B – Weed biology and ecology
	17:15 – 18:00	Section 1C – Horticulture and special crops
Wednesday November 28th	6:30 – 8:00	Breakfast Meeting for 2008 Program Committee
	6:00 – 7:30	Continental Breakfast
	7:30 – 14:00	Poster and Commercial Display Viewing
	7:30 – 10:00	Graduate Student Presentations
	10:00 – 10:30	Health Break
	10:30 – 12:30	Graduate Student Presentations (continued)
	12:30 – 14:30	Awards Banquet
	14:30 – 18:00	Symposium on Ragweed
	18:30 – 23:00	CropLife Canada Reception
Thursday November 29th	7:30 – 8:30	CWSS-SCM Breakfast and Photo Contest Awards
	8:30 – 10:00	CWSS-SCM Annual Business Meeting
	10:00 – 12:15	Section 2A – Cereals, oilseeds, and pulses
	10:00 – 10:45	Section 2B – Invasive and noxious weeds
	11:00 – 12:00	Section 2C – Forage, rangeland, forestry, and industrial vegetative management
	12:00 – 15:00	CWSS-SCM Board Member Meeting / Lunch

2007 Local Arrangements Committee Members

For further information about the meeting please contact the Chair or a Local Arrangements Committee member as listed below:

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Physical weed control: Progress and challenges
La lutte physique : Progrès et défis

Symposium Session
Agenda
Tuesday, November 27th, 2007

Time	Title	Speaker	Affiliation
8:45 – 8:50	Welcome and announcements	Len Juras	President, CWSS
8:50 – 8:55	Local arrangements	Diane Lyse Benoit	Agriculture and Agri-Food Canada-Saint-Jean-sur-Richelieu, Québec
8:55 – 9:10	Introduction to physical weed control	Maryse Leblanc	Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe,Québec
9:10 – 9:30	Blind harrowing in cereals in eastern Canada... a must?	Maryse Leblanc	Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe,Québec
9:30 – 9:50	Mechanical weeding in pulse and cereal crops: Is there a fit in large-scale western Canadian agriculture?	Eric Johnson	Agriculture and Agri-Food Canada-Saskatoon, Saskatchewan
9:50 – 10:10	Cultivation management strategies in row-planted soybean and corn	Daniel Cloutier	Institut de malherbologie, Beaconsfield,Québec
10:10–10:40	Health Break		
10:40–11:10	Physical weed control for vegetable and fruit crops	Nathan Boyd	Nova Scotia Agricultural College, Nova Scotia
11:10–11:55	Tools and innovations in mechanical weed control in north-western Europe	Rommie Y. van der Weide	Applied Plant Research, Lelystad, The Netherlands
11:55–13:15	Lunch		
13:15–14:00	Thermal weed control with the focus on flame weeding	John Ascard	Swedish Board of Agriculture, Alnarp, Sweden
14:00–14:30	Physical weed control in integrated weed management systems: Integrating cover crops	Darren Robinson	Ridgetown Campus University of Guelph, Ontario
14:30–14:50	Mechanical weed control in a non-inversion system: 10 years without herbicides	Thomas Dewavrin	Les Fermes Longprés Ltée, Les Cèdres, Québec
14:50–15:20	Round table with speakers and audience discussing the days presentations and content	Ghislain Jutras	Université Laval, Québec, Québec.
15:20–15:35	Conclusions/ Future Developments/ Summary	Steve Shirtliffe	University of Saskatchewan, Saskatchewan

Blind harrowing in cereals in eastern Canada … a must? Leblanc, M.L.[1], Cloutier, D.C.[2] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2]Institut de malherbologie, Beaconsfield, QC.

The rotary hoe and the spring-tine harrow are the most widely used cultivators in cereals in eastern Canada. They are used in a technique called blind harrowing where the cultivator passes over the crop rows and inter-rows equally. The use of this technique can result in damage to the cereals by burying or uprooting the crop. Cereals are cultivated from preemergence or early postemergence until the early tillering stage. Cultivation intensity can be modified by tractor speed, cultivation depth or by machinery adjustments. In general, decreasing the speed of the spring-tine harrow reduces crop damage. Cultivation depth and aggressiveness can be adjusted on recent models of spring-tine harrows by a gauge wheel and/or tine angle tension setting. Cultivation must be as selective as possible in order to achieve an excellent level of weed control while minimizing crop damage. This is often difficult to achieve because a greater level of weed control increases the risks of crop damage. Some studies done in Québec have shown that cereals are most susceptible to spring-tine harrowing at the 2-leaf stage (Z-11). At this stage, cereal seedlings are less well rooted and easier to bury. In situations where weed density is low and the likelihood of yield losses minimal, it may not be economically worthwhile to cultivate. The decision not to cultivate is more likely to be made when other management practices such as optimum seeding time, choice of amendments, fertilizer placement, have been put in place to make the crop more competitive against weeds.

Mechanical weeding in pulse and cereal crops: Is there a fit in large-scale western Canadian agriculture? Johnson, E.N.[1], Thomas, A.G.[2], Leeson[2], J.Y, Shirtliffe, S.J.[3] and Brandt, S.A.[1]. [1]Agriculture and Agri-Food Canada (AAFC), Scott, SK: [2]AAFC, Saskatoon, SK [3]Department of Plant Sciences, University of Saskatchewan, Saskatoon SK.

Prairie farms are typically larger in acreage than farms in other parts of Canada and the short growing season requires quick and efficient methods of seeding, weed control, and harvesting. The Prairie Provinces have seen a massive adoption of zero-tillage with the 2006 Census reporting that over 60% of Saskatchewan crop land is zero-tilled seeded. Although zero-till has been widely adopted, the province of Saskatchewan has also seen a steady growth in organic field crop production and has the largest acreage in Canada with about 295,000 hectares of certified production in 2005. Surveys of organic farmers indicate that all they practice some sort of tillage and most rate summerfallow, fall and spring pre-seeding tillage as important means of weed control. There has been a number of mechanical weed control studies conducted for organic producers at Scott and Saskatoon since 1997. Pre-emergence rod-weeding of field pea (*Pisum sativum* L.) resulted in good to excellent control of wild oat (*Avena fatua* L.) and wild mustard (*Sinapis arvensis* L.) if timed properly. Harrow types (rotary, flex-tine, rigid-tine) had very little impact on crop / weed selectivity when conducted postemergence in field pea; however, implement setting did. Research conducted at Scott and Saskatoon indicates that spring oat (*Avena sativa* L.) and barley (*Hordeum vulgare* L.) are more tolerant to post-emergence harrowing than spring wheat (*Triticum aestivum* L.). Despite significant research, there has been little adoption of post-emergence mechanical weeding by organic growers. Some of the reasons for this lack of adoption are: lack of specific recommendations, reluctance of growers to purchase specialized equipment, and variability of effectiveness from year to year. A long-term cropping study at Scott indicates that crop residues on organic treatments are not usually sufficient to prevent erosion in an annual cropping situation; therefore, mechanical techniques must be able to work when crop residues are present and must be able to cover the fields quickly. Preliminary results with a min-till rotary hoe in 2007 show promise.

Cultivation management strategies in row-planted soybean and corn. Cloutier, D.C.[1], Leblanc, M.L.[2]
[1]Institut de malherbologie, Beaconsfield, QC; [2] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC

Row-planted soybean and corn have been cultivated mechanically more or less intensively for more than 50 years. The common strategy used to cultivate these row crops generally consists of using at least two different types of cultivators. One type is used broadcast to cultivate both on the crop row and between rows earlier in the season while the other type of cultivator is more aggressive and is used to remove weeds between crop rows later in the season.

The cultivators used broadcast (rotary hoe and/or spring tine harrow) are selective and are generally used preemergence or early postemergence. These cultivators are normally used once or twice at the beginning of the season. The overall purpose is to selectively destroy newly emerged weed seedlings and germinating weeds while not damaging the crop. Selectivity can be achieved by planting the crop more deeply than cultivation depth, or by cultivating when the crop is at a growth stage where it is better rooted than weed seedlings, or by cultivating when the crop is able to recover from being cultivated.

Once the crop is well established and that early germinating weeds have been successfully removed, cultivation is generally done once or twice between crop rows later during the season using a crop cultivator. If weed population levels are high on the crop row, ridging can be used to bury weeds partially or totally and destroy them.

Physical weed control for vegetable and fruit crops. Boyd, N. S.[1], Benoit, D. L.[2], Panneton, B.[2],
[1] Nova Scotia Agricultural College, Truro, NS; [2] AAFC Saint-Jean-sur-Richelieu, Québec

Weeds remain one of the major yield-limiting factors for many horticultural crops in Canada. Increased interest in cultural and physical weed management techniques has been driven in part by the : (i) lack of registered herbicide products available for use in horticultural crops, (ii) demand for reduced pesticide residue levels, and (iii) tighter maximum residue limits for foreign and domestic markets. Management practices are diverse because horticultural crops have drastically different canopies both between and within species. This dictates the seeding/planting density and geometry adopted to maximize crop yield and it indirectly influences weed population dynamics. Canopy structure also affects the type of implement that can be utilized to reduce weed pressures. The choice of implement is based on control target (inter or intra row), weed diversity and pressure, weed and crop growth stage, and soil conditions. Immediate efficacy, duration of efficacy, crop damage, operational restrictions, and passages frequency should all be taken into account when evaluating potential mechanical weeders. Reliance on mechanical control can be reduced with the utilization of living, dead, or inert mulches. The use of inert mulches composed of recycling by-products can result in improved soil and water conservation, reduced pesticide inputs, increased crop quality and yield, and improved weed, insect, and disease control. Appropriate management of residues can also lead to improved weed management. This is especially evident in no-till vegetable production systems where mulches can reduce weed pressure and maintain yields. In all production systems, the management of intra-row weeds is especially challenging because crops are easily damaged by mechanical equipment. The adoption of precision agriculture may lead to more narrow intra-row zones or technologies that differentiate between crop plants and weeds. Site specific techniques will probably be most effective when a range of data types (e.g. crop location, reflectance, etc.) work in conjunction.

Tools and innovations in mechanical weed control in north-western Europe. Van der Weide, R.Y.[1], Bleeker, P.O.[1], Lotz, L.A.P.[2], Ascard, J.[3], Melander, B.[4] [1]Applied Plant Research Wageningen UR (PPO-WUR), Lelystad, the Netherlands; [2]Plant Research International (PRI-WUR) Wageningen, the Netherlands; [3] Swedish Board of Agriculture, Alnarp, Sweden; [4]Aarhus University, Faculty of Agricultural Sciences, Department of Integrated Pest Management, Research Centre Flakkebjerg, Slagelse, Denmark

Weed control is one of the main problems in organic farming. Labour for hand weeding is expensive and difficult to organize, especially in slow growing and non-competitive vegetable crops. Various implements are used for controlling weeds. Research and practice on in-row weed control have focused on the use of harrowing, brushing, torsion weeding and finger weeding successively. Recent tools have been developed using compressed air to control the weeds in the crop row or a high-precision hoe which moves out of the crop row to avoid each crop plant. Pictures and more information can be found on the website of the Physical and Cultural Weed Control Working Group of the European Weed Research Society (www.ewrs.org/pwc). Possibilities vary according to crop type, stage and environmental conditions.

Mechanical weed control is less common in conventional arable crop farming in north-western Europe. Harrows are mainly used pre-emergence, for example in silage maize. Row crop cultivators are commonly used for inter-row weeding in several horticultural crops, especially where no effective herbicides are available. Ridging is common in potato and some vegetables. Developments are mainly aimed at increasing capacity and accuracy. Steering systems have been developed to improve the accuracy of mechanical weed control cultivators. Mechanical steering systems, optical steering systems and systems using satellite navigation (RTK-DGPS) both on the tractor and on the cultivator are used. These enable the width of unhoed strip to be reduced considerably without loss of driving speed.

The challenges in mechanical weed control in the crop rows are to increase capacity and efficacy close to crop plants and to improve the economics of intelligent intra-row weeders. Improvements have been made in the detection of crop and weed plants, fast actuation in the crop rows, and in robotics. It is expected that the introduction of innovative technologies (e.g. low-cost vision sensors, high-pressure injection systems) will reduce the cost of new implements for agriculture. Involvement of larger manufacturers could boost these technologies and thereby help meet steadily increasing demand.

Thermal weed control with the focus on flame weeding. Ascard, J.[1] ,Van der Weide, R.Y.[2], Cloutier, D.C.[3] Leblanc, M.L.[4] [1] Swedish Board of Agriculture, Alnarp, Sweden, [2]Applied Plant Research WageningenUR (PPO-WUR), Lelystad, the Netherlands; [3]Weed Science Institute, Sainte-Anne-de-Bellevue (Québec), Canada, [4]Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe (Québec), Canada

Many thermal weed control methods have been developed as alternatives to chemical and mechanical weed control. These include flaming, infrared radiation, hot water, steam, electrical energy, microwave radiation, ultraviolet radiation, laser treatment and freezing. Of these, flaming and to some extent infrared radiation, steam, hot water and electrocution have been used commercially. Flaming kills plants mainly by rupturing cells, which leads to tissue desiccation. Flaming provides rapid weed control, but has relatively low selectivity and no residual weed control effect. The dose-response models describing plant response to flaming treatments in terms of propane input per unit area are sigmoid in shape. The heat treatment dose must therefore be adjusted to take into consideration weed species and growth stage. Flame weeding was commonly used in the USA until the 1960s, mainly for post-emergence weed control in row crops such as cotton, soybeans and maize. The main use of flame weeding in Europe today is in organic production when mechanical methods are less effective. Flaming is used as an integral part of the weed management strategy, typically as a single pre-emergence treatment in carrots and other slow-germinating vegetable crops. Flaming is also used after crop emergence in maize, onions, brassicas and some other heat-tolerant crops and for potato haulm destruction. Flaming and hot water are sometimes used for weed control in urban areas. Flame weeding has demonstrated environmental benefits in terms of impacts on crop, soil and water, but uses more energy and releases more combustion by-products than mechanical and chemical methods. Flaming and most other thermal methods generally have high equipment costs and slow driving speeds. However, there is the potential to improve the efficacy and energy efficiency of thermal weeders. New tools for high precision flame weeding in the crop row are currently being developed. Techniques for band-steaming of weeds are also progressing and are already being introduced commercially in Scandinavia to reduce the need for hand-weeding in organic vegetable crops.

Physical weed control in integrated weed management systems: Integrating cover crops. Robinson, D.E. Department of Plant Agriculture, University of Guelph, Ridgetown Campus, Ridgetown, ON.

Although vegetable growers have been using cover crops for soil management purposes, there are concerns in the following year about a number of factors, including weed competition, moisture use by the cover crop, and the added expense and time required to manage the cover crop. Some research has shown that soil moisture conservation beneath certain chemically killed single-species of ground covers increases soil moisture levels in comparison to bare, cultivated soils, suggesting that management factors such as cover crop species and time of kill are important to successful use of cover crops. A number of studies have shown that cover crops have a limited and often inconsistent impact on weed growth unless properly managed through appropriate use of cultivation and/or herbicides. Different weed species, as a result of seasonal germination patterns relative to coverage provided by cover crops, may also show differential responses to cover crops. Other factors that affect the utility of cover crops in conventional cropping systems may include their response to herbicide residues from previous years.

Mechanical weed control in a non-inversion system: 10 years without herbicides. Dewavrin, Thomas. Les Fermes Longprés Ltd, Les Cèdres, Québec. fermlong@videotron.ca

Les Fermes Longprés Ltd is a family farm with three brothers in equal partnership. We have been producing without herbicides for the past 10 years and without plowing for the past 15 years.

The transition has been gradual. It was a conventional farm until we started ridge tillage in 1991. At the same time, we decreased our use of herbicides by 70% by using band application of herbicides from 1991 to 1995. Also, starting in 1991, we worked on improving row cultivation by modifying and improving our mechanical weed control equipment. We started producing organically in 1997.

Currently we aim to increase the precision of our field operations to within 2,5 cm when using our field machinery. We are also conducting research and field trials on insect and green manure management.

Our farm currently has 590 ha under production with 42% in soybean, 32% in spring wheat, 17% in corn, 6% in common vetch and 3% in sunflower.

Physical weed control: Progress and challenges
La lutte physique : Progrès et défis (Posters)

POSTER PRESENTATIONS	
Title	**Authors**
Unité de coupe à lame : potentiel en lutte physique	Benoit, D.L., Fortin, S. et Bélanger, M.
Susceptibility of row-planted soybeans to the rotary hoe	Leblanc, M.L. and Cloutier, D.C.
Susceptibility of Cranberry bean to the rotary hoe	Leblanc, M.L. and Cloutier, D.C.
Soybean response to rotary hoeing and row spacing management systems	Leblanc, M.L. and Cloutier, D.C.
Le pyrodésherbeur / Propane flamers.	Leblanc, M.L. and Cloutier, D.C.
Weed thermo-sensitivity to propane flaming	Leblanc, M.L., Cloutier, D.C., Sivesind, E., Stewart, K.A., and Séguin, P.
Horticultural crops thermo-sensitivity to propane flaming	Leblanc, M.L., Cloutier, D.C., Sivesind, E., Stewart, K.A., and Séguin, P.
Corn susceptibility to rotary hoeing and spring-tine harrowing	Leblanc, M.L. and Cloutier, D.C.
Physical weeding in beets	Leblanc, M.L., Cloutier, D.C., Sivesind, E., Stewart, K.A., and Séguin, P.
Rotary hoeing in sweet corn	Leblanc, M.L., Cloutier, D.C., Stewart, K.A.
Spatial variation in tillage practices across the prairies	Leeson, J. Y., and Thomas, A. G.
Primary tillage as a physical weed control technique	Peruzzi, A., van der Weide, R.Y., Cloutier, D.C., Leblanc, M.L.
Secondary tillage as a physical weed control technique	Peruzzi, A., van der Weide, R.Y., Cloutier, D.C., Leblanc, M.L.
Temporal variation in effectiveness of in-crop management systems	Thomas, A. G., and Leeson, J. Y.

Unité de coupe à lame : potentiel en lutte physique. Benoit, D.L., Fortin, S. et Bélanger, M. Centre de recherche et développement en horticulture. Agriculture et agroalimentaire Canada, Saint-Jean-sur-Richelieu, QC.

La production de la carotte repose principalement sur un seul herbicide, le linuron. Le développement de plusieurs espèces résistantes au linuron a été documenté dans plusieurs provinces. En absence d'herbicides de rechange au linuron, la répression adéquate des mauvaises herbes devient de plus en plus difficile. La production des carottes sur buttes est de plus en plus favorisée parmi les producteurs, rendant le désherbage sur le rang et le sarclage mécanique dans l'entre-rang problématique. La carotte génère ses feuilles à partir du méristème au niveau du collet de la racine – donc au niveau du sol. La plupart des mauvaises herbes dicotylédones se développe leur feuilles à partir de bourgeons que l'on retrouve aux noeuds de la tige et séparé par des entre-nœuds de longueur variée. Ces différences morphologiques entre la carotte et les mauvaises herbes dicotylédones pourraient permettre d'utiliser la coupe non sélective comme moyen de lutte. Cette technique permettrait de ralentir la croissance des mauvaises herbes dicotylédones sans impact significatif sur la croissance de la carotte.

L'objectif des travaux était de développer et mettre au point une unité de coupe composée d'un module de coupe basé sur le principe de la scie à ruban, d'un système de guidage automatique de la hauteur de coupe et d'un support pour l'unité de coupe se fixant à l'attelage adapté d'un tracteur. L'unité de coupe permet la coupe sur une planche de 1.8 m de largeur semé de 3 rangs de carottes. Les essais préliminaires de 2007 ont établi la hauteur minimale de coupe à 7,02 cm ± 2,76 cm du sol et la fenêtre d'utilisation entre 3 à 6 feuilles de la carotte. La repousse des carottes est rapide mais une répression subséquente des mauvaises herbes fauchées est essentielle afin d'atteindre la récolte.

Susceptibility of row-planted soybean to the rotary hoe. Leblanc, M.L.[1] and Cloutier, D.C.[2]. [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC.

A three-year study was conducted to determine soybean susceptibility to physical damage from cultivations done with the rotary hoe in a weed-free situation. Plot size was large enough to enable the rotary hoe to be used at a speed of 15 km h^{-1}. The soybeans were systematically cultivated at eight growth stages, from pre-emergence to fourth trifoliate leaf. Two, three and four cultivations were done on a combination of growth stages. Soybean population decreased with the number of cultivations but yields were either not affected or significantly increased compared with the uncultivated control. Cultivations with the rotary hoe could be done up to the 4th trifoliate leaf growth stage without risk of decreasing yield.

Susceptibility of Cranberry bean to the rotary hoe. Leblanc, M.L.[1] and Cloutier, D.C.[2] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC.

A 3-yr study was conducted to assess cranberry bean susceptibility to mechanical weeding using a rotary hoe at preemergence, hook, cotyledon, unifoliate, and first to fourth trifoliate stages of bean development and at different combinations of stages. The experiment was conducted in a weed-free environment. Cultivation with the rotary hoe reduced bean yield only for the treatment that received four cultivations at four different bean growth stages. Three cultivations improved yield compared with no cultivation. Single cultivation done at any of the eight crop growth stages did not affect yield. Crop density at harvest was decreased 6% in the treatments receiving two cultivations and 9% in the treatments receiving four cultivations compared with no cultivation. The effects of the cultivations on grain moisture were not consistent and differed from year to year. Seed weight did not differ among treatments in either year. Because this study was conducted under weed-free conditions, the beneficial effects of cultivating with the rotary hoe are probably mostly related to breaking the soil crust, improving soil aeration, preserving soil moisture, or promoting mineralization of the nutrients required by the crop.

Soybean response to rotary hoeing and row spacing management systems. Leblanc, M.L.[1] and Cloutier, D.C.[2] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC.

A three year experiment was conducted from 1999 to 2001 inclusively to investigate soybean response to rotary hoeing under narrow (17 cm spacing) or wide (76 cm spacing) row spacing. The experiments were kept weed-free at all time by using herbicides in order to prevent confounding the effects of weed interference with crop damage. Soybeans were systematically cultivated once with a rotary hoe at early growth stages: pre-emergence, hook stage, 1st unifoliate stage, 1st, 2nd or 3rd trifoliate stage. There was a control treatment that did not receive any cultivation. There were no significant differences in soybean yield, population density, grain humidity or 1000 grain dry weight between cultivation treatments done at the various soybean growth stages. The tractor wheel tracks, however, did significantly decrease soybean yield when cultivations were done at any of the trifoliate stages, indicating that soybeans cannot compensate for physical damage that they might suffer at a later growth stage. Soybeans density and yield variables differed significantly between narrow and wide row spacing. This effect might be more attributable to the type of seeder used than to the seeding density and the wheel tracks damage.

Le pyrodésherbeur / Propane flamers. Leblanc, M.L.[1], Cloutier, D.C.[2] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2]Institut de malherbologie, Beaconsfield, QC.

Propane flamers consists of a set of burners mounted on a toolbar connected to a propane tank. Two general type of flamers are presented. The first one was developed in-house to control weeds prior to crop emergence. It uses vapor burners of the same type as the ones used on barbecues. The flame was enclosed in a metal box in order to increase their thermal efficacy. The second type is a commercial row crop flamer used pre- or postemergence of the crop. It uses liquid burners which are set towards the base of the crop plant in order to minimize crop damage. Angle of the burner, tractor speed and propane rate are variables that can be adjusted to optimize flamer efficacy. The mode of action of the flamer is not by burning the plants but by increasing cell temperature for a fraction of a second. This is sufficient to disrupt cell walls and denature proteins, thereby killing the cells and eventually the plant.

L'arrangement des brûleurs au propane sur une barre porte-outil et le réservoir d'alimentation au propane qui s'y attache forment le pyrodésherbeur. Deux types de pyrodésherbeur sont présentés. Un prototype a été conçu afin de désherber uniquement en prélevée de la culture. Il utilise la phase gazeuse du propane comme un barbecue. La flamme est contenue dans une boîte de métal afin d'augmenter son efficacité. Un pyrodésherbeur commercial à flamme nue a été utilisé pour désherber en pré et postlevée de la culture. Il utilise la phase liquide du propane. Les brûleurs sont dirigés vers la base des plants de la culture afin de réduire les dommages à celle-ci. L'angle des brûleurs, la vitesse et dose de propane sont des variables permettant d'optimiser l'efficacité du pyrodésherbeur. Le pyrodésherbage consiste à réprimer les mauvaises herbes à l'aide de la chaleur produite par une flamme au propane. Le mode d'action n'est pas de consumer la plante mais d'augmenter la température des cellules végétales durant une fraction de seconde qui sera suffisante pour détruire leurs parois et dénaturer les protéines et engendra par la suite la mort des cellules et éventuellement de la plante.

Weed thermo-sensitivity to propane flaming. Leblanc, M.L.[1], Cloutier, D.C.[2], Sivesind, E.[3], Stewart, K.A.[3], and Séguin, P.[3] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC; [3] McGill University, QC.

A two year study was conducted to determine the thermo-sensitivity of 4 weed species: *Amaranthus retroflexus*, *Chenopodium album*, *Echinochloa crusgali* and *Setaria pumila* to propane flaming based on propane doses (speed at 2, 3, 4, 5 and 6 km h^{-1} ; pressure-rate at 2,7, 4,3 et 5,9 kg h^{-1} giving propane doses varying from 0,4 to 3 g m^{-1}) and weed growth stages. At least 20 seedlings per growth stage, per species, and per dose were tagged to determine their response to flaming. Weed thermo-sensitivity increased with the dose but decreased as the weed growth stages increased. More than 90 % of the dicotyledonous seedlings at cotyledon, 1 or 2 leaf-stages were thermo-sensitive to doses less than 1 g m^{-1} whereas at the 6-leaf stage, a propane dose of at least 3 g m^{-1} was needed to reach a similar level of weed control. The grasses tested were not thermo-sensitive to propane flaming at the doses used in this project. The 1- to 3-leaf-stages had some thermo-sensitivity with a mortality varying between 30 to 50 %. This low response to flaming is caused by a regrowth of the grass seedlings since their growing point is under the soil surface when flamed.

Horticultural crops thermo-sensitivity to propane flaming. Leblanc, M.L.[1], Cloutier, D.C.[2], Sivesind, E.[3], Stewart, K.A.[3], and Séguin, P.[3] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC; [3] McGill University, QC.

A two year study was conducted to determine the thermo-sensitivity of four vegetable crops (broccoli, Spanish onion, spinach and garden beet) to a range of propane doses (tractor speed at 2, 3, 4, 5 and 6 km h^{-1} ; pressure-rate 2,7, 4,3 and 5,9 kg h^{-1} resulting in propane doses varying from 0,4 to 3 g m^{-1}) at various growth stages. All experiments were conducted under weed-free conditions (achieved by hand-weeding as needed) and only the crop rows were flamed.

Beet and spinach are direct seeded in Quebec and their seedlings are slow to emerge, providing an opportunity to use propane flaming prior to crop emergence. Preemergence flaming gave excellent results by keeping the crop rows weed-free for 7 to 10 days after flaming, depending on weather conditions. However, these crops are extremely sensitive to postemergence flaming which can result in severe yield losses. Although the flame was directed to the base of the plant (at an angle of 30^o) the crop's young leaves were very sensitive to the heat treatment. For spinach, the LD50 was determined to be 1,3 and 1,5 g m^{-1} of propane whereas for beet, it was at 1,5 and 2,6 g m^{-1} of propane for the 4- and the 6-leaf stages, respectively. Propane doses higher than 1 g m^{-1} should not be used postemergence in these crops. Optimal weed control can be obtained with a combination of preemergence flaming and postemergence mechanical weed control.

Transplanted crops such as broccoli and Spanish onion are very tolerant to postemergence flaming. The LD50 for broccoli at 10 days after transplantation (DAT) was 1,7 g m^{-1} whereas it was estimated to be 4,6 g m^{-1} at 14 DAT, a dose not tested in this project. Spanish onion was the crop showing the best tolerance to propane flaming. Its LD50 at 10 DAT was estimated to be 6,1 g m^{-1} of propane. After 15 DAT, neither of these two crops showed any thermo-sensitivity to flaming at the rates used in this project. Broccoli and Spanish onion yield obtained in the flamed treatment was comparable to that obtained in the manually weeded control. For both crops, it is possible to combine flaming and mechanical weed control on and between rows to obtain the maximum weed control without any yield decrease.

Corn susceptibility to rotary hoeing and spring-tine harrowing. Leblanc, M.L.[1], Cloutier, D.C.[2] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2]Institut de malherbologie, Beaconsfield, QC.

A four year study was conducted to assess grain corn susceptibility to mechanical weeding using a rotary hoe and a spring-tine harrow. Corn was systematically cultivated at different growth stages, from preemergence to stem elongation. The experiment was conducted in a weed-free environment. Rotary hoeing tended to decrease corn yield at preemergence and the 7-leaf stage. However, yield was not significantly decreased by single, double or triple cultivations with the rotary hoe compared with the uncultivated control. Four cultivations produced a significantly lower yield than either two or three cultivations. Spring-tine harrowing tended to decrease corn yield at the 6-leaf stage. The treatments that received one or two cultivations had the same yield as the uncultivated control. Three or four cultivations tended to decrease yield compared with the uncultivated control.

Physical weeding in beets. Leblanc, M.L.[1], Cloutier, D.C.[2], Sivesind, E.[3], Stewart, K.A.[3], and Séguin, P.[3] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC; [3] McGill University, QC.

A two-year study was conducted to determine the effectiveness of different combinations of flaming and mechanical weeding on diverse beet stages. The flaming and mechanical weeding experiment consisted in sequentially flaming once, twice, three or four times (pre-emergence, at pre- and 2, at pre-, 2 and 4, or at pre-, 2, 4 and 6 leaves stages). The torsion weeder was used for the stages not flamed (at 2, 2 and 4, or 2 and 4 and 6 leaves stages) or either the Torsion Weeder or the Buddingh Finger Weeder were used alone at pre-emergence, at 2, 4 or 6 leaves stages. There were two check treatments: weekly hand-weeding and without weeding. Flaming in combination with the torsion weeder provided beet yield similar to or higher than the hand-weeded check. Yield decreased as the number of flaming increased. The treatments cultivated four times with either the torsion weeder or the finger weeder produced greater yields than the weed-free check.

Rotary hoeing in sweet corn. Maryse L. Leblanc[1], Daniel C. Cloutier[2], Katrine Stewart[3]. [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, Beaconsfield, QC; [3] McGill University, QC.

A two-year study was conducted to assess sweet corn susceptibility to mechanical weeding using a rotary hoe at pre-emergence to 6-leaf stages of corn development and at different combinations of stages. The experiment was conducted in a weed-free situation. In general, sweet corn can be cultivated with the rotary hoe at least once without yield reduction from preemergence to the 6-leaf stage. Some yield increases were observed in cultivated treatments compared with the uncultivated treatment. The beneficial effects of cultivating with the rotary hoe is probably attributable to the breaking of the soil crust, improving soil aeration, preserving soil moisture or promoting mineralization of the nutrients required by the crop. Cob number and maturity were reduced after 3 or 4 cultivation with the rotary hoe. Late season cultivars or late seeded corn were more susceptible to damage by cultivation.

Spatial variation in tillage practices across the prairies. Leeson, J. Y., and Thomas, A. G. Agriculture and Agri-Food Canada, Saskatoon, SK.

In the Prairie Provinces, producers may till their fields at various times including preceding summer fallow, after harvest in the fall, before seeding in the spring, at seeding, and after seeding. Data from the Prairie Weed Management Survey of cereal, oilseed and pulse crops conducted in Alberta, Manitoba and Saskatchewan in 2001, 2002 and 2003, respectively, allow the quantification of these tillage practices. Tillage operations at any of these times may have an impact on weed populations but operations associated with seeding and fertilizer applications are excluded from the analysis since these are not primarily for weed control. Tillage use and intensity for physical weed control differed both between provinces (less in Saskatchewan) and within provinces (higher in northern regions). With the exception of southern Saskatchewan, the majority of producers used one or more tillage operations. Weeds were controlled by tillage in 79% of fallow fields. Fall tillage was only common in Manitoba and northern Alberta. In these regions, over 49% of the area received fall tillage, while less than 25% of the area in the other regions received fall tillage. Pre-seeding tillage was most common in northern Alberta, the only region where more than half the area was tilled prior to seeding. Post-seeding tillage (pre- or post-emergent) occurred at low levels throughout the prairies (6% of the area); however, only 1% of the area received post-emergent harrowing. The majority of producers only used one harrow pass and/or one other higher disturbance tillage operation in either the spring or fall. The exception was the northern area of Alberta where it was more common to use two or more tillage passes with higher disturbance levels. Over 75% of the higher disturbance passes were with a cultivator indicating that tillage intensity was generally low across the prairies.

Primary tillage as a physical weed control technique. Peruzzi, A.[1], van der Weide, R.Y.[2], Cloutier, D.C.[3], and Leblanc, M.L.[4] [1]Sezione Meccanica Agraria e Meccanizzazione Agricola (MAMA), DAGA – University of Pisa, via S. Michele degli Scalzi, Pisa, Italy; [2]Applied Plant Research, PO Box 430, 8200 AK Lelystad, The Netherlands; [3]Institut de malherbologie, Beaconsfield (Québec); [4]Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe (Québec).

Any integrated weed management system must start by considering primary tillage techniques and their effect on weed populations management, whether the cropping systems are based on soil inversion or not.

Tillage generally refers to the changing of soil conditions for the enhancement of crop production according to the American Society of Agricultural Engineers. It can be further sub-divided in three categories: primary tillage, secondary tillage, and cultivating tillage.

In cropping systems based upon soil inversion, primary tillage is the first soil-working operation. Its objective is to prepare the soil for planting by reducing soil strength, covering plant material and by rearranging aggregates. In these cropping systems, primary tillage techniques are always aggressive. This type of tillage is usually carried out at a considerable depth, leaving an uneven soil surface. For weed species that are propagated by seeds, primary tillage can contribute in controlling them by burying a portion of the seeds at depths from which they will not be able to emerge. Primary tillage can also play a role in controlling perennial weeds by burying some of their propagules more deeply, thereby preventing or slowing down their emergence. A portion of the propagules can be brought up to the soil surface where they will be exposed directly to cold or warm temperature and to desiccation. The tools used to perform primary tillage in cropping systems based upon soil inversion are mainly mouldboard ploughs, but also disc ploughs, powered rotary ploughs, diggers and chisel ploughs can be used with this purpose.

Secondary tillage as a physical weed control technique. Peruzzi, A.[1], van der Weide, R.Y.[2], Cloutier, D.C.[3], and Leblanc, M.L.[4] [1]Sezione Meccanica Agraria e Meccanizzazione Agricola (MAMA), DAGA – University of Pisa, via S. Michele degli Scalzi, Pisa, Italy; [2]Applied Plant Research, PO Box 430, 8200 AK Lelystad, The Netherlands; [3]Institut de malherbologie, Beaconsfield (Québec); [4]Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe (Québec).

Any integrated weed management system must consider secondary tillage techniques and their effect on weed population management.

Secondary tillage is generally used to further work the soil with seedbed preparation being the final secondary tillage operation. Secondary tillage should not be confused with tertiary tillage, also referred to as cultivating tillage. The overall purpose of secondary tillage is to pulverize the soil to prepare it for seeding or planting, mix various amendments and pesticides into the soil, level and firm the soil, close air pockets, and control weeds.

The various secondary tillage implements are: field cultivators, harrows, disc harrows, spring tine harrows, rigid tine harrows, radial blade harrows, rolling harrows and PTO powered machines. Depending on field conditions and how these tools are used, they can either help keep weed populations under control or increase weed problems.

Temporal variation in effectiveness of in-crop management systems. Thomas, A. G., and Leeson, J. Y. Agriculture and Agri-Food Canada, Saskatoon, SK.

In the alternative cropping systems study at Scott, SK, systems are defined in terms of three cropping diversities (low, annual grains, annual and perennial) and three input levels (high, reduced, organic). Physical weed control by harrowing is used in the organic treatments and herbicides are used in the high treatments for in-crop weed management in the wheat, barley and pea phases of the 6-yr rotations. Weed counts conducted immediately before in-crop treatment (pre-treat) and at the end of July (residual) during the past twelve years allow an assessment of the effectiveness of these management systems. Based on paired t-tests, 37% and 20% of the treatment years showed a significant decrease in weed density after in-crop treatment in the high and organic input systems, respectively. In most treatment years the density did not significantly change from the pre-treat to residual counts in either the high or organic systems (60 and 64%, respectively). In the remainder of the treatment years, the residual densities were significantly higher than the pre-treat densities. The low number of treatment years with a significant decrease in density may be due to incomplete control by in-crop treatments or weed germination after the in-crop treatment. In all but one organic treatment the residual densities were less than 20 plants m^{-2} in at least one year. In all of the organic treatments residual weed densities were more than 100 plants m^{-2} in at least one year (33% of treatment years). In the high input system the residual densities were less than 20 plants m^{-2} in 74% of treatment years and only more than 100 plants m^{-2} in one year in three treatments. The large yearly variation in effectiveness of in-crop weed management systems indicates the importance of timing of treatments in relation to temperature and precipitation, particularly for post-emergent harrowing.

Tuesday November 27th, 2007
Session 1A – Soybean, corn, and edible beans

ORAL PRESENTATIONS

Time	Title	Speaker
16:00 – 16:15	Banque d'imagerie scientifique et technique en phytoprotection.	Michel Lacroix
16:15 – 16:30	Agronomic merits of cover crops and zero tillage for dry bean production	Robert E. Blackshaw
16:30 – 16:45	Flumioxazin: A new preemergence tool for weed control in soybean	Beth Connor
16:45 – 17:00	Roundup Ready vs. conventional cropping systems	Robert Gulden
17:00 – 17:15	Optimum™ GAT™ trait - new technology for weed management in row crops.	Pamela Livingston
17:15 – 17:30	Tank mix options for weed management in Roundup Ready® Corn 2.	Brian Legassicke
17:30 – 17:45	Halex GT for optimum weed management in glyphosate tolerant corn	Paul Cowan
17:45 – 18:00	Weed management options in glyphosate tolerant corn	Peter Sikkema

POSTER PRESENTATIONS

Title	Authors
Automatic estimation of weeds relative cover using image processing	Panneton B., Longchamps L., Brouillard M., Leroux G.
The contrasted responses of crops and weeds to 12 years of tillage and fertilization treatments.	Légère, A.*, Stevenson, F.C., and Ziadi, N.
Four years of reduced herbicide rates based on image sampling and weed cover thresholds.	Simard M.-J.*, Panneton, B., Longchamps, L.-, Lemieux, C., Légère, A., and Leroux, G.
Weed management systems in dry bean	Soltani*, N., Vyn, R., Shropshire, C., and Sikkema, P.H.
Sandbur control in soybean with imazethapyr	Sikkema, P.H., Vyn, J.D., Kramer, C., and Soltani*, N.
Waterhemp control in corn and soybean with sequential herbicides	Soltani*, N., Vyn, J.D., and Sikkema, P.H.
RR corn and rotation effects on ground beetle abundance and diversity	Bourassa, S., Cárcamo, H., Spence, J.R., Blackshaw, R.E.*, Postman, B., Floate, K.D.
Response of ground beetle (Coleoptera: Carabidae) field populations to four years of Bt corn production.	Floate, K.D., Cárcamo, H.A., Blackshaw, R.E.*, Postman, B., Bourassa, S.

Banque d'imagerie scientifique et technique en phytoprotection. Lacroix, M. Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec, Québec, QC

Au Québec, des spécialistes et des experts en entomologie, en malherbologie et en phytopathologie, oeuvrant dans les secteurs public et privé, possèdent une expertise de pointe sur les problèmes phytosanitaires affectant les productions fruitières, maraîchères, ornementales, serricoles et grandes cultures. Leur savoir en phytoprotection se traduit par des collections d'images sur les problèmes phytosanitaires (origines biotique et abiotique) et par des connaissances acquises au fil de nombreuses années d'expérience en protection des cultures. Le développement d'une banque d'imagerie scientifique et technique en phytoprotection a comme objectif global la mise en commun et la transmission des sources visuelles et des connaissances détenues par ces spécialistes et ces experts. Cet outil informatique, qui sera en ligne sur Internet, permettra aux intervenants, oeuvrant auprès des entreprises agricoles, d'avoir accès à cette information spécialisée et validée qui leur assurera une autonomie accrue pour le diagnostic des problèmes phytosanitaires et leur offrira une source de renseignements validés sur ceux-ci. En entomologie, les conseillers pourront réaliser la recherche d'images et l'identification des acariens, des insectes et d'autres invertébrés utiles et phytophages, et ce, pour chacune des cultures incluses dans la banque d'imagerie scientifique et technique en phytoprotection. Pour les trois spécialités, les utilisateurs auront également accès à la recherche d'images associées à la symptomatologie et pourront réaliser un diagnostic sur l'origine des symptômes associés aux acariens, aux insectes et à d'autres invertébrés phytophages, aux dommages de phytotoxicité par les herbicides ainsi qu'aux maladies parasitaires et aux problèmes non parasitaires. Pour le présent projet, trois modules sont en développement, soit les grandes cultures (maïs, soya et céréales), les petits fruits (bleuet, canneberge, fraise, framboise et vigne) et les plantes ornementales.

Agronomic merits of cover crops and zero tillage for dry bean production. Blackshaw, R.E. Agriculture and Agri-Food Canada, Lethbridge, AB

Multi-year field studies were conducted to determine the potential for dry bean production under conservation tillage practices. Study 1 examined zero tillage dry bean production when planted into wheat, barley, canola or flax stubble. Dry bean emergence was delayed by 3 days in one of six site-years with zero tillage compared with conventional tillage but maturity was not affected. Dry bean density was similar or higher with zero than with conventional tillage. Weed densities were slightly higher with zero tillage but were well controlled with in-crop sethoxydim and bentazon. Over all previous crop stubbles and years, dry bean yield was similar with both tillage systems. Study 2 examined the potential benefits of a cereal cover crop preceding dry bean production. Fall-seeded cover crops were often superior to spring-seeded cover crops in terms of providing sufficient ground cover to reduce soil erosion and reducing weed emergence and growth. Among the fall-seeded cover crops, winter rye provided the greatest ground cover and often caused the greatest weed suppression. Dry bean density was not affected by any of the cover crops, but fall-seeded cover crops delayed emergence by up to 5 days and delayed maturity up to 4 days. Nevertheless, cover crops increased dry bean yield by 5 to 13% when in-crop herbicides were used and by 20 to 90% in the absence of in-crop herbicides. Results indicate that farmers should consider zero tillage dry bean production when sufficient previous crop residues exist. However, if dry bean is to be grown following low residue crops, such as potato or sugar beet, then farmers should consider including a cover crop in their cropping system. Information gained in these studies will be used to advise farmers on more sustainable dry bean production practices.

Flumioxazin: A new preemergence tool for weed control in soybean. Connor B., Engage Agro Corporation, Guelph, Ontario.

Flumioxazin is a new Group 14 herbicidal active ingredient that provides residual control of susceptible weeds in soybean. Once activated by water, flumioxazin provides preemergence control of selected grass and broadleaf weeds by inhibiting protoporphyrinogen oxidase (PPO), an essential enzyme required by plants for chlorophyll biosynthesis. Seedling weeds are controlled when exposed to sunlight following contact with the soil applied herbicide. This product was registered in the U.S. in 2001 with proven efficacy against key weed species and crop tolerance of soybean. The efficacy and crop tolerance for control of weeds in soybean fields has been evaluated in Canada since 2004. A single application at 70-105 g ai ha^{-1}, just prior to planting or within 3 days of planting, was tested; treatments included flumioxazin alone on conventional tillage sites and in a tank mix with glyphosate on no-till sites. Results showed that flumioxazin provided excellent control of broadleaf weeds, including pigweed, ragweed, common lamb's-quarters, and nightshade, which helps to eliminate early season weed competition. The tank mix of flumioxazin + glyphosate provided excellent postemergence burndown and residual preemergence control of weeds. Flumioxazin was shown to be safe for use on soybeans, as well as on rotational crops.

Roundup Ready vs. conventional cropping systems. Gulden, R.H. University of Manitoba, Winnipeg, MB.

Herbicide resistant crops are popular among producers and the availability of glyphosate resistant genotypes in a number of crops allows for these to be grown in rotation. This can result in rotations where weed control is based on a single herbicide. Glyphosate resistant and conventional corn and soybean were grown in rotation with and without winter wheat for six years at five locations in Ontario with each phase of the two and three year rotations present each year. Of the five locations, two were no-till, while the remaining three locations were under conventional tillage management. Broadleaf and grassy weed control and the agronomic performance of the crops were determined throughout the duration of this study. The effect of herbicide system on mid-season weed communities also was evaluated in each crop during the last three years of the study. Treatment with glyphosate improved weed control in corn and soybean compared to conventional herbicide programs, but this generally did not result in greater yields. Discriminant analysis revealed significantly different mid-season weed communities in the glyphosate-based systems compared to the conventional herbicide programs. Weed communities in glyphosate treated corn and soybean tended to be more similar to each other than weed communities in corn and soybean treated with conventional herbicides. In comparison, the mid-season weed communities associated with winter wheat in the three year rotation tended to be distinctly different from those found in corn and soybean under either herbicide program.

Optimum™ GAT™ trait - new technology for weed management in row crops. Forney D.R.[1], Saunders D.W.[1], Chicoine T.K.[1], Green J.M.[1], Castle L.[2], Hazel C.B.[2]; [1]DuPont Crop Protection, Newark, DE, [2]Pioneer HiBred International, Johnston, IA

Optimum™ GAT™ is the trademark for a new technology offering a seed-herbicide system with crop tolerance to both glyphosate and ALS-inhibitor herbicides. The glyphosate N-acetyltransferase gene is a new approach to conferring tolerance to the herbicide glyphosate based on its rapid conversion in crops of glyphosate to the non-herbicidal compound N-acetylglyphosate. The gene coding for this enzyme was isolated from a naturally occurring soil bacterium, improved by gene shuffling to be more active on glyphosate, and incorporated into the germplasm of several crop species via standard molecular biology techniques. The enzyme is expressed constitutively, and confers tolerance to extremely high dosages of glyphosate throughout the plant life cycle. The acetolactate synthase gene in the Optimum™ GAT™ trait plants codes for an ALS enzyme with specific modifications in the amino acid sequence that prevent the ALS-inhibitor herbicides from binding and inhibiting its function in the biosynthesis of amino acids. It provides tolerance to all classes of ALS inhibitors. The two traits are combined in plants to provide tolerance to both classes of herbicides. This technology enables the opportunity to bring new ALS-inhibitor herbicides into crops to address a variety of customer needs, including management of weeds that glyphosate is now having difficulty controlling. DuPont will develop solutions based on industry supported integrated management practices, including utilization of the most appropriate herbicides of various modes-of-action possessing inherent or enhanced selectivity to crops, to address glyphosate, ALS, and other herbicide resistant weed populations. These systems, delivered through proprietary blends technologies, will provide greater flexibility and choices to customers for sustainable weed control practices.

Tank mix options for weed management in Roundup Ready® Corn 2. Legassicke, B.C. and Neyedley R.A., Monsanto Canada Inc., Guelph, Ontario and Winnipeg, Manitoba.

Trials evaluating weed control with Roundup WeatherMAX® tank mixes in Roundup Ready Corn 2 were conducted at 8 locations across Ontario and Quebec in 2006. Residual herbicides including atrazine, dicamba/atrazine, s-metolachlor/benoxacor + atrazine, dimethenamid + atrazine, pendimethalin + atrazine, mesotrione and dicamba were tank mixed at full and ¾ label rates with Roundup WeatherMAX at 1.67 L/ha. Applications were made at the 2-3 leaf stage of corn and weed control ratings were made early in the season at 8-42 days after treatment and late in the season at 78-111 days after treatment. Key weed species evaluated included common-lamb's-quarters, common ragweed, pigweed species, velvetleaf, foxtail species, barnyardgrass and witchgrass. The addition of residual herbicides to Roundup WeatherMAX improved overall weed control at both rating dates, but more significantly at the late rating. Roundup WeatherMAX alone (applied once at 2-3 leaf corn) provided 81% weed control at the late rating and with the tank mixes this improved to 88-97% control. Corn yield was also improved with the tank mixes versus a single application of Roundup WeatherMAX. There was little difference between the full and ¾ label rate tank mixes of the residual herbicides for weed control and yield. Roundup WeatherMAX applied twice (2-3 leaf corn and 7-8 leaf corn) also improved weed control (to 98%) and yield. Tank mixes with Roundup WeatherMAX and residual herbicides appear to be viable options to provide early weed burndown and follow-up residual control with a single application in Roundup Ready Corn 2. (Roundup and Roundup WeatherMAX are trademarks of Monsanto Technology LLC, Monsanto Canada Inc. licensee).

Halex GT for optimum weed management in glyphosate tolerant corn. Cowan, P. Field Development Biologist, Syngenta Crop Protection Canada Inc., Plattsville, ON

Halex GT is a new herbicide specifically designed to improve glyphosate tolerant (GT) corn production. It will provide an agronomically sound alternative postemergent GT herbicide program while maintaining the convenience of a one-pass treatment.

Halex GT is a pre-mix combination of S-metolachlor, mesotrione and glyphosate. Halex GT provides superior crop safety and control of emerged weeds with residual activity of many annual grass and broadleaf weed species.

Weed management options in glyphosate tolerant corn. Sikkema, P.H.[1], Soltani, N.[1], Nurse, R.E.[2], Van Eerd, L.L.[1], Vyn, R.[1] [1]University of Guelph Ridgetown Campus, Ridgetown, ON; [2]Agriculture and Agri-Food Canada, Harrow, ON

Seven field trials were conducted at various locations in Ontario over a two-year period (2006 and 2007) to study the effect of various weed management strategies in glyphosate tolerant corn on weed control, corn yield, environmental impact and net income. There was no visible injury with the postemergence herbicides evaluated. Results were field specific. At 56 days after treatment, depending on location, glyphosate EPOST, glyphosate LPOST, dicamba/atrazine plus glyphosate EPOST, isoxaflutole/atrazine PRE fb glyphosate LPOST, and glyphosate EPOST fb glyphosate LPOST provided 45-97, 91-100, 40-98, 97-100, and 98-100% control of annual grasses and 65-97, 69-100, 83-100, 97-100, and 98-100% control of annual broadleaf weeds in glyphosate tolerant corn, respectively. The most consistent weed control was provided by the two-pass programs when a residual herbicide (PRE) was followed by glyphosate LPOST or when a sequential application of glyphosate was applied EPOST followed by LPOST. Yield was reduced as much as 86% when weeds were not controlled. There was no difference in yield among the two-pass herbicide programs evaluated. The isoxaflutole/atrazine PRE fb glyphosate LPOST had the lowest environmental impact of the two-pass herbicide programs evaluated. On average, the most profitable weed management program in corn was a sequential application of glyphosate.

Automatic estimation of weeds relative cover using image processing. Panneton B.[1], Longchamps L.[2], Brouillard M.[1], Leroux G.[2] [1]Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, QC; [2]Université Laval, Ste-Foy, QC

Weeds are distributed in patches. If it were possible to know the distribution of these patches, herbicides application could be more precisely targeted, thus leading to economical advantages and environmental benefits. In order to understand the behavior of weed patches in a field, pictures of two 2 ha fields were taken during a four year period. The following rotation of crops was applied: two years of corn, one year of soybean and one year of corn. Pictures having a precision of about 1 pixel per mm2 were acquired just prior to the best estimated spraying time, when corn was 3 to 5 leaves or the first soybean trifoliated leaf was out. To obtain relative cover of weeds (projected area covered by weeds over projected area covered by all vegetation), the crop needed to be discriminated from weeds. Images representing various levels of relative cover for corn and soybean on two different fields were processed manually to separate the crop from the weeds using Photoshop(TM). For these images, the true value of relative cover was computed. An algorithm was developped for calculating the relative cover automatically. It is based on the detection of the rows of crop and on estimating the area cover by weeds between the rows. From this estimate and a measure of the total area covered by vegetation, the relative weed cover was computed assuming that the weed density between the crop plants on the row is equal to the weed density away from the row. The estimated relative cover of weeds was compared to the true relative cover and sources of errors were identified. From this analysis, potential correction schemes were identified.

The contrasted responses of crops and weeds to 12 years of tillage and fertilization treatments. Légère, A.[1], Stevenson, F.C.[2], and Ziadi, N.[3] [1]Agriculture and Agri-Food Canada (AAFC) Saskatoon, SK; [2]Research Consultant, Saskatoon, SK; [3]AAFC Québec, QC

Minimizing inputs such as fertilizers, herbicides, or tillage may be sought by producers to satisfy economical as well environmental goals. A study, initiated in 1992, examined the effects of nitrogen (N) and phosphorus (P) fertilization and tillage on crop growth and yield in a corn-soybean rotation. Early

results suggested that corn yields decreased as N and P rates were reduced, regardless of tillage system, whereas soybean yields were little affected by tillage or nutrients. Effects on weeds were not examined at the time. We hypothesized that after 12 years of treatments, weeds would be more prevalent and weed communities more diverse as N and P fertilization was reduced or eliminated, particularly in plots that had received no fertilizers, more so with no-tillage (NT) than with intensive tillage (CT). Our objective was to measure the cumulative effects of 12 years of N and P treatments applied to two tillage systems (CT vs. NT) on weed communities and crop yields in a corn-soybean rotation. Overall, 12 years of NT resulted in more diverse and productive weed communities than those observed in treatments where no N or P had been applied. Effects of nutrient input on weeds may have been mitigated by the background P fertility level of the soil and by residual N benefits derived from the legume crop. Conversely, corn yields were reduced by 70% in the absence of N and by 25% in NT compared to CT treatments. Soybean yields were reduced in NT with increasing P rates compared to other treatments, bur reductions never exceeded 10%. Overall, corn and soybean had different responses to treatments, with corn yields being far more affected by fertilization and tillage than soybean yields. However, the absence of tillage had a much greater effect than the absence of nutrient input on weed community assembly and biomass, suggesting the importance of a weed management program specifically tailored for NT systems.

Four years of reduced herbicide rates based on image sampling and weed cover thresholds. Simard M.-J.[1], Panneton, B.[2], Longchamps, L.[1-4], Lemieux, C.[1], Légère, A.[3], and Leroux, G.[4]. [1]Agriculture and Agri-Food Canada (AAFC), Québec, QC; [2]AAFC-St-Jean-sur-Richelieu, QC; [3]AAFC-Saskatoon, SK, [4]Université Laval, Département de phytologie-Québec, QC.

Most pesticides (>70%) applied in field crops are herbicides. Reducing herbicide rates in these crops would significantly reduce pesticide loads. Some weeds can be left in a crop without affecting crop yield and this knowledge could be used to reduce herbicide rates. The basic problem to this approach is determining how many weeds can be left to grow. One approach is to evaluate the relative cover of the crop and the weeds using images. A threshold can be determined when weeds have little impact on yields and this threshold used as a basis to reduce herbicide rates. Our goal was to evaluate the feasibility of this approach during a four year corn-soybean rotation at two locations (Beaumont and St-Jean-sur-Richelieu, QC). Two 1.62 ha fields subdivided in 18 plots (30 X 30 m) were grown in corn and soybean (2006 only) from 2004 to 2007. One third of the plots were sprayed with full rates (1X) of glyphosate or conventional herbicides and the other plots received variable rates (0, 0.5 or 1X) of the same herbicides based on the relative weed cover (evaluated using six images taken before herbicide application). Every year, weeds were counted in six quadrats (50 X 75 cm) before and after herbicide application. Weed cover thresholds allowed reduced rates on 11/12 plots (91,7 %) at both sites in 2004. Afterwards, relative weed cover evaluations were higher and most plots (81.7 % average) receiving variable rates were sprayed at full dose. Weed counts done before herbicide application were significantly higher (p>0.05) in plots receiving variable rates every year after the first variable herbicide application, despite the low frequency of variable rates after 2004 and overall crop yield protection. Results indicate weed thresholds and herbicide applications should be based on weed control instead of yield protection only.

Weed management systems in dry bean. Soltani*, N., Vyn, R., Shropshire, C., and Sikkema, P.H. Department of Plant Agriculture, University of Guelph Ridgetown Campus, Ridgetown, ON.

Three field experiments were conducted over a three-year period (2004, 2005 and 2006) to evaluate various weed management programs in white bean in Ontario. Herbicide treatments evaluated caused no visible injury in white beans. Trifluralin provided 12% grater control of common lamb's-quarters compared to s-metolachlor. There was no benefit of tankmixing s-metolachlor + trifluralin in respect to

yield and profitability compared to either trifluralin or s-metolachlor alone. The postemergence application of bentazon + fomesafen following a soil applied herbicide resulted in improved control of common lamb's-quarters 15%. Two inter-row cultivations following a soil applied herbicide resulted in improved control of redroot pigweed, common lamb's-quarters, and green foxtail. The addition of imazethapyr (60% label dose; 45 g a.i. ha^{-1}) to the soil applied grass herbicide resulted in improved control of redroot pigweed, common lamb's-quarters 16%, and green foxtail 6%. There was an increase in profitability with the use of s-metolachlor or trifluralin. There was a further increase in profitability by adding imazethapyr (60% label dose) to the grass herbicide. Profitability was increased by following the grass herbicide with a postemergence (POST) application of bentazon plus fomesafen or two interrow cultivations. There was a decrease in profitability by applying a tankmix of s-metolachlor + trifluralin. There was a decrease in profitability if a POST application of bentazon plus fomesafen or two inter-row cultivations followed a soil applied herbicide that included imazethapyr (60% label dose).

Sandbur control in soybean with imazethapyr. Sikkema, P.H., Vyn, J.D., Kramer, C., and Soltani*, N. Department of Plant Agriculture, University of Guelph Ridgetown Campus, Ridgetown, ON.

Five field trials were conducted at various locations in Ontario over a two year period (2005 and 2006) to study the efficacy of imazethapyr applied at various timing for the control of sandbur in soybean. Treatments consisted of a weedy check, a weed-free check, early and delayed preemergence (PRE) imazethapyr (100 g ai/ha) and postemergence (POST) applied imazethapyr (100 g ai/ha) at spike to five-leaf stage of sandbur. There was no visible injury to soybean 7, 14 and 28 days after treatment (DAT). Imazethapyr PRE treatments provided 46 to 66% control of sandbur. Imazethapyr POST provided up to 72, 66, 78, 91, 78 and 71% control of sandbur when applied at spike, one-, two-, three-, four-, and five-leaf stage, respectively. Sandbur density ($\#/m^{-2}$) and biomass (g/m^{-2}) corresponded with the level of sandbur control. Generally, there was an improvement of sandbur control as the imazethapyr application timing was delayed until the three-leaf stage and then the control decreased when the application timing was delayed past this stage. Yield was reduced as much as 30% when sandbur was not controlled. Imazethapyr PRE treatments did not affect yield but imazethapyr POST when applied at spike, one-, two-, three-, four-, and five-leaf stage increased yield 44, 28, 39, 24, 38, and 20%, respectively. Based on these results, imazethapyr PRE does not provide adequate control of sandbur in soybean however, imazethapyr applied POST at three-leaf stage has potential for the control of sandbur in soybean.

Waterhemp control in corn and soybean with sequential herbicides. Soltani*, N., Vyn, J.D., and Sikkema, P.H. Department of Plant Agriculture, University of Guelph Ridgetown Campus, Ridgetown, ON.

Common waterhemp (*Amaranthus tuberculatus*) is an aggressive annual broadleaf weed that is a dominant species in cropping systems in the mid-western United States. Waterhemp was first identified in Ontario, Canada in 2002 and is expected to rapidly infest agricultural land in eastern Canada similar to its development in the United States. In 2005 and 2006, four separate field experiments (2 in corn & 2 in soybean) were established on two Ontario farms (near Petrolia and Comber, Ontario) with heavy infestations of waterhemp to evaluate the efficacy of various PRE- and POST-emergence herbicides applied alone or in sequence for the control of waterhemp in corn and soybean. There was no injury to corn and soybean from any of the herbicide treatments evaluated. In corn, sequential herbicide programs of isoxaflutole + atrazine PRE fb either dicamba POST, dicamba/diflufenzopyr POST, dicamba/atrazine POST or mesotrione + atrazine POST provide consistent full-season control of waterhemp. Corn yield was reduced 48% when waterhemp was not controlled. Corn yield was equivalent to the weed-free check with the herbicide treatments evaluated. In soybean, PRE or POST herbicides alone provided 52 to 94%

control of waterhemp however, waterhemp control was 92 to 99% with the sequential herbicide programs. Dimethenamid (PRE; 1250 g/ha) followed by glyphosate (POST1; 900 g/ha) followed by glyphosate (POST2; 900 g/ha) controlled waterhemp 99%. Results with waterhemp density was similar to visible control. Soybean yield was reduced 41% when waterhemp was not controlled. Soybean yield was equivalent to the weed-free check with all the herbicide treatment except dimethenamid PRE, acifluorfen POST1 and fomesafen POST1 where the yield was lower 30, 19 and 19%, respectively.

RR corn and rotation effects on ground beetle abundance and diversity. Bourassa, S[1,2], Cárcamo, H.[2], Spence, J.R.[1] Blackshaw, R.E.[2], Postman, B.[2], Floate, K.D.[2] [1]Department of Renewable Resources, University of Alberta, Edmonton, AB; [2]Agriculture and Agri-Food Canada, Lethbridge, AB

Ground beetles (Coleoptera, Carabidae) were sampled in conventional and genetically modified herbicide -resistant (GMHR) corn under rotation and continuous regime to investigate the influence of herbicide type and rotation effect on the structure of their assemblages. In plots under rotation, the carabid activity density was higher both years but the diversity was lower than plots without rotation. The influence of herbicide type was noticeable on the activity density of a few carabid species and probably related to differences in the vegetation. Some smaller bodied carabids such as *Bembidion quadrimaculatum* L. were less abundant in GMHR plots due to a higher weed density in the mid season while the opposite was observed for larger carabid such as *Pterostichus melanarius* (Ill). Overall, rotating corn with canola had a much stronger effect on the species composition than the herbicide treatment. This study suggests that GMHR corn have little impact on the overall carabid fauna but may influence the activity of certain species by altering the weed community.

Response of ground beetle (Coleoptera: Carabidae) field populations to four years of Bt corn production. Floate, K.D.[1], Cárcamo, H.A.[1], Blackshaw, R.E.[1], Postman, B.[1], Bourassa, S.[1,2]
[1]Agriculture and Agri-Food Canada, Lethbridge, AB; [2]Department of Renewable Resources, University of Alberta, Edmonton, AB

Ground beetles (Coleoptera: Carabidae) are useful biomonitors of environmental change in agroecosystems. They are common, speciose, include different trophic guilds (predators, herbivores, scavengers, and occasionally parasitoids), and can be systematically captured in large numbers with little effort using pitfall traps. During a 4-yr period, pitfall traps were operated in southern Alberta to compare ground beetle assemblages in plots of transgenic corn expressing a Bt ‘Cry’ protein with efficacy against Lepidoptera (Bt), conventional corn grown with insecticide application (I), and the same conventional cultivar grown without insecticide application (NI). A total of 13,319 adult ground beetles representing 39 species were captured during the study. No effect of treatment was detected on total beetle abundance or species richness in any year. Treatment effects were detected for individual species in some years, but not in a manner that could be readily ascribed to an effect of the Bt corn. Captures of two species in 2001 were lower in Treatment Bt than in Treatments I or NI. Captures of a third species were higher in Treatment I than in Treatments Bt or NI. No other effects of treatment were detected. Based on these results, we conclude that cultivation of Bt corn in the current study did not appreciably affect ground beetle populations.

Tuesday November 27th, 2007
Session 1B – Weed biology and ecology

ORAL PRESENTATIONS

Time	Title	Speaker
16.00 – 16:15	Development of a demographic model to predict the influence of management practices on gene flow in spring wheat (*Triticum aestivum* L)	Linda Hall
16.15 – 16:30	*Sclerotinia minor*: a safe broad-spectrum bioherbicide to control multiple weed targets in turfgrass.	Mohammed H. Abu-Dieyeh
16.30 – 16:45	SAgE pesticides, un outil d'information sur les risques pour la Santé et l'Environnement ainsi que sur les usages Agricoles pour une gestion rationnelle et sécuritaire des pesticides utilisés au Québec.	Danielle Bernier
16.45 – 17:00	Québec Pesticide Risk Indicator.	Pierre-Antoine Thériault
17:00 – 17:15	Strategies to increase tame oat competition with wild oat	Steve Shirtliffe

POSTER PRESENTATIONS

Title	Authors
Target site mutations in the acetolactate synthase (ALS) gene in ALS inhibitor-resistant kochia populations from western Canada (*Kochia scoparia*).	Warwick S.I.*, Renlin X., Sauder, C. and Beckie H.J.
The Biology of Canadian Weeds; update on the series.	Clements, D.R. and Cavers, P.B.
Herbicidal activity of clove oil and its constituents and the effect of light intensity on response to essential oils in lambsquarters (*Chenopodium album* L.) and broccoli.	Manda, A., Matraszek, R., Isman, M.B., and Upadhyaya, M.K.
Bioherbicide R & D: Development of a misting system to promote dew in the field.	Hynes, R.K.*, Peng, G., Byer, K., Hupka, D. and Boyetchko, S.M.

Development of a demographic model to predict the influence of management practices on gene flow in spring wheat (*Triticum aestivum*). Hall L. M.[1,2], Nielson R.[3], Topinka A.K.[2], Strobeck C.[4]
[1]Alberta Agriculture and Food, Edmonton; [2]Agricultural, Food and Nutritional Sciences, University of Alberta, Edmonton; [3]Bayer Crop Protection, Winnipeg, MB; [4]Biology Department, University of Alberta, Edmonton.

While glyphosate resistant wheat was withdrawn prior to unconfined release, it engendered considerable research and interest in the biology of volunteer wheat, crop gene flow and the potential cost of segregation of GM wheat. Using glyphosate resistant wheat as a model system, we developed a demographic model of gene flow in agronomic systems. The model incorporates selection pressure by various types of herbicides; a seedbank sub-model that accounts for harvest seed loss, subsequent seedling emergence and persistence of seed; and outcrossing between volunteers and crops, over eight years of a variable crop rotation. To account for density dependent seed production, the model incorporates a modified hyperbolic equation developed by Cousens, and differential competition from herbicide affected and unaffected volunteers. A worst case rotation, maximizing selection pressure by glyphosate, was used to test the sensitivity of volunteer density and genotype to intrinsic and extrinsic model parameters. The proportion of outcrossing did not significantly influence the persistence or density of volunteer wheat; however, it did change the proportion of hemizygote to homozygous resistant volunteers. Several key factors affecting resistant volunteers were related to the seed bank, including the percentage harvest loss, rate of predation, and the time and relative proportion of emergence in the fall and spring. Diversity of rotations, a decrease in selection pressure and an increase in control of glyphosate resistant wheat were critical to a reduction of adventitious presence. This model shows that manipulation of the seed bank and management factors such as diverse rotations can influence adventitious presence of herbicide resistant volunteers. Models can be useful to investigate multiple scenarios and provide insights into knowledge and research gaps.

***Sclerotinia minor*: a safe broad-spectrum bioherbicide to control multiple weed targets in turfgrass.**
Abu-Dieyeh M. H.[1], Teshler M.P.[2] and Watson A. K.[2]. [1]Department of Biology and Biotechnology, The Hashemite University, Zarqa-Jordan. [2]Department of Plant Science, McGill University, Ste-Anne-de-Bellevue, Quebec, Canada,

Dandelion (*Taraxacum officinale* Weber ex Wiggers) and other broadleaf weeds are responsible for declining and destroying the desired monoculture of turfgrass systems. An asporogenic fungus, *Sclerotinia minor* as a barley grit formulation has been the subject of continued research in the Weed Science Laboratory of McGill University with the goal of developing and registering a bioherbicide product. In this study, the susceptibility of broadleaf weeds to *S. minor* was investigated. In multiple field experiments, 32 broadleaf weeds, belong to 13 different families, were found to be susceptible to spot application of the *S. minor* bioherbicide. Of those, 23 are not previously reported as hosts for the *S. minor*. The bioherbicide did not infect or damage turfgrass species. The bioherbicide did not persist in the environment and could not be detected 10 days after application in the soil using a lettuce seedling bioassay. Our results address the importance of a one pathogen multiple-weed strategy to overcome commercial limitations of a single target biological control paradigm.

SAgE pesticides, un outil d'information sur les risques pour la Santé et l'Environnement ainsi que sur les usages Agricoles pour une gestion rationnelle et sécuritaire des pesticides utilisés au Québec.
Turcotte, C.[1], Néron, R.[1], Bernier, D.[1], Dion, S.[2], Samuel, O.[3], St-Laurent, L.[3] [1] Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), Québec, Québec; [2] Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP); [3] Institut national de santé publique (INSPQ)

Les producteurs et conseillers agricoles sont de plus en plus préoccupés par les conséquences de l'utilisation des pesticides. Ils doivent faire le choix des produits sans connaître l'ensemble de leurs caractéristiques. En effet, les renseignements sur les caractéristiques toxicologiques et environnementales des pesticides sont peu accessibles et généralement difficiles à interpréter.

Pour appuyer les initiatives d'utilisation rationnelle et sécuritaire des pesticides en milieu agricole, SAgE pesticides vise à rendre accessible dans un seul site l'information relative aux caractéristiques et aux usages des produits antiparasitaires. L'information liée aux caractéristiques toxicologiques, écotoxicologiques, au devenir des pesticides dans l'environnement, de même qu'une appréciation des risques pour la santé et l'environnement s'y retrouvent. L'information présentée fournit la liste des traitements homologués pour faire face à un ennemi des cultures et les informations agronomiques pertinentes. Ce projet s'appuie sur la réglementation fédérale et provinciale dans le domaine de l'homologation et de l'utilisation des produits antiparasitaires.

SAgE permettra aussi à l'ensemble des producteurs d'avoir accès à des répertoires des traitements pesticides complets, incluant l'appréciation des risques pour la santé et l'environnement. Ils seront continuellement remis à jour. Les répertoires seront composés automatiquement à partir d'information présente dans la base de données.

Dans son ensemble, SAgE pesticides comprend une interface de saisie et une base de données sécurisée, un module expert d'interrogation et un outil Internet d'information. Une version opérationnelle de SAgE pesticides sera mise en ligne au printemps 2008.

Québec Pesticide Risk Indicator. Samuel, O.[1], Dion, S.[2], St-Laurent, L.[1], April, M.-H.[3] [1]Québec National Institute for Public Health (INSPQ), Québec, QB; [2]Québec Ministry of Sustainable Development, Environnement and Parks (MDDEP), Québec, QB; [3]Québec Ministry of Agriculture, Fisheries and Food (MAPAQ), Québec, QB.

The Québec Pesticide Risk Indicator (QPeRI), is a diagnostic and decision-assisting tool designed to optimize pesticide management. Several pesticide risk indicators found in the scientific literature were considered in the development of this tool. In the end, the indicator developed by the Norwegian Minister of Agriculture served as a platform for the QPeRI. This work is the result of a close collaboration between the INSPQ, the MDDEP and the MAPAQ. The QPeRI establishes a situational and evolutional diagnostic of risks from pesticide use: at the farm business level, at the sectorial/organizational level or at the provincial level. In an integrated pest management effort, its use encourages the choice of pesticides with lesser risks and promotes solutions to reduce these risks. The QPeRI has two components, the QPeRI-health and the QPeRI-environment. The QPeRI-health was elaborated by the INSPQ using a new classification system for toxicological effects as no decision criteria concerning pesticide chronic health toxicity existed for effects other than cancer. It relies on acute and chronic toxicity of pesticides and integrates both their environmental persistence and bioavailability potential. Furthermore, it considers some characteristics of end-use products such as the amount of active ingredient, the formulation, the application rate and technique. The QPeRI-environment is an indicator of ecotoxicological risk and potential environmental impacts and was developed jointly by the MAPAQ and the MDDEP. It takes into account environmental fate and behaviour of pesticides as well as their toxicity for non-target species. Similarly to QPeRI-health, this indicator considers characteristics of end-use products such as the amount of active ingredients and the application rate. Both indicators can be calculated with an online pesticide application record (www.irpeqexpress.qc.ca) that also allows the user to plan risk reduction strategies.

Strategies to increase tame oat competition with wild oat. Shirtliffe, S.J.[1], May, W.E.[2], Willenborg, C.J.[3] [1]University of Saskatchewan, Saskatoon, SK. [2]AAFC, Indian Head Research Farm, Indian Head, SK. [3]University of Manitoba, Winnipeg, MB

Wild oat is the most common weed problem in tame oat production in western Canada because there are no herbicides to control it. Previous research has found that larger wheat seed is more competitive with wild oat that smaller wheat seed. The objective of this study is to assess the effect of oat seed size on the competitive interaction between tame oat and wild oat. To test this objective an experiment was conducted which used oat seed of different individual caryopsis (groat) size planted at two plant populations (250 and 500 plants/m^{-2}) grown with and without wild oat competition (0 and 250 plants/m^{-2}). The experiment was repeated four times. Increasing oat seeding rate from 250 to 500 plants m^{-2} resulted in a 15% greater yield when wild oat was present. When wild oat was not present, the higher tame oat density slightly depressed yield. Oats grown from larger seed had higher yield when wild oat was present but had no effect on oat yield when wild oat was not present. When wild oat was present, for every mg increase in individual seed weight, there was a 21 kg ha^{-1} increase in oat yield. Oat grown from larger seed also reduced wild oat biomass produced by 7 kg ha^{-1} for each mg increase in individual seed size. In conclusion oats grown from larger seed is more competitive with wild oat than oats grown from smaller seed.

Target site mutations in the acetolactate synthase (ALS) gene in ALS inhibitor-resistant kochia populations from western Canada (*Kochia scoparia*). Warwick S.I.[1], Renlin X.[1], Sauder, C.[1] and Beckie H.J.[2] [1]Agriculture and Agri-Food Canada (AAFC), ECORC Ottawa, ON; [2] AAFC-Saskatoon, Saskatoon, SK.

Acetolactate synthase (ALS)-herbicide resistance levels and the molecular basis for resistance were determined for six susceptible (HS) and 24 resistant (HR) kochia (*Kochia scoparia*) populations from western Canada, 3 from Alberta (AB), 3 from Manitoba (MB) and 18 from Saskatchewan (SK). HR plants survived spray application of the ALS-inhibitor herbicide thifensulfuron:tribenuron mixture in the greenhouse. Most of the HR populations were heterogeneous and contained both HR and HS individuals. The molecular basis for resistance was determined in 273 HR individuals by sequencing the *ALS* gene and/or conducting a single nucleotide polymorphism (SNP) genotyping assay developed in this study. A total of 16 SNPs were identified in the *ALS* sequences, 5 of which (SNP 565, 566, 1116, 1708 and 1709) resulted in amino acid changes that confer resistance to ALS-inhibiting herbicides. The SNPs correspond to three target-site mutations: Pro_{197} [SNPs 565 and 566], Asp_{376} [SNP 1116] and Trp_{574} [SNPs 1708 and 1709]. The Trp_{574}Leu mutation was predominant [201 HR plants], and a SNP genotyping for SNP 1709 identified the G to T transversion that results in the Trp_{574}Leu substitution. The next most common mutation was the highly-variable residue Pro_{197} [44 HR plants] with substitution by one of nine amino acids, Ala, Arg, Gln, Leu, Lys, Met, Ser, Thr, and Trp; the least frequent were Asp_{376}Glu [9 plants]and Trp_{574}Arg [1 plant] substitutions. The presence of two *ALS* target-site mutations was found in 18 individual kochia plants, the first report from field-selected weed populations. These double mutations include combinations Pro_{197} + Trp_{574} [11 plants] and Pro_{197} + Asp_{376} [7 plants]. Pro_{197}, Asp_{376} and Trp_{574} mutations and the Pro_{197} + Asp_{376} combination were detected in individual HR plants from all three western provinces, while the Pro_{197} + Trp_{574} combination was found only in the SK HR-populations.

The Biology of Canadian Weeds; update on the series. Clements, D.R.[1] and Cavers, P.B.[2] [1]Biology and Environmental Studies, Trinity Western University, Langley, BC; [2]Department of Biology, University of Western Ontario, London, ON.

The series on the Biology of Canadian weeds now encompasses over 130 original papers and four updates. There have been five volumes of collected papers issued, most recently in 2005. A list of species for which accounts are in preparation will be available with this poster and contributors are asked to examine the list and make corrections as needed. Lists of published accounts and of species for which accounts are solicited will also be available. The Canadian Journal of Plant Science also now publishes accounts for a sister series entitled "The Biology of Invasive Alien Plants in Canada"; criteria for deciding which series a given plant fits under will be presented.

Herbicidal activity of clove oil and its constituents and the effect of light intensity on response to essential oils in lambsquarters (*Chenopodium album* L.) and broccoli. Manda, A., Matraszek, R., Isman, M.B., and Upadhyaya, M.K. Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC.

Herbicidal activities of clove oil and its constituents eugenol, caryophyllene and humlene (0.005 to 0.12M) on broccoli and lambsquarters seedlings leaves were studied by measuring their effects on cell membrane integrity. Leaf discs (10 mm diameter; n = 5), excised from broccoli (2^{nd} true leaf) and lambsquarters (6^{th} true leaf) leaves sprayed with essential oil solutions, were shaken in a rotary shaker at 90 RPM for 3 h and the concentration of electrolytes leaked in the bathing medium was measured using a conductivity meter. Most of the phytotoxicity of clove oil was due to eugenol, its largest (90.4%) constituent. Humlene and caryophyllene, constituting 3.6 and 6.1% respectively of clove oil, played smaller roles in determining clove oil phytotoxicity. In dose response studies, however, humlene was found to be more phytotoxic than caryophyllene or eugenol. In a separate study, effects light intensity on susceptibility of broccoli and lambsquarters seedling leaves to clove oil and eugenol were studied by growing seedlings under 1, 2, or 3 layers of black nylon mesh, spraying leaves with eugenol or clove oil, and measuring the tissue damage as described above. Seedling leaf area and the specific leaf weight ($g.m^{-2}$) increased with increasing light intensity for the 2^{nd} true leaf of broccoli and the 6^{th} true leaf of lambsquarters. Light intensity had a significant effect on the phytotoxicity of these oils. Spray retention, measured using a methyl orange (0.01%) solution, played a minor role in determining the effect of light intensity on essential oil injury. Increased production of leaf epicuticular wax in response to light intensity may be important in this regard.

Bioherbicide R & D: Development of a misting system to promote dew in the field. Hynes, R.K., Peng, G., Byer, K., Hupka, D. and Boyetchko, S.M. Agriculture and Agri-Food Canada, 107 Science Place, Saskatoon, SK. S7N 0X2

Colletotrichum truncatum (schwein.) Andrus and W. D. Moore is a potential bioherbicide agent for scentless chamomile, *Matricaria perforate* Mérat, a noxious weed in western Canada. Microencapsulation of *C. truncatum* conidia in a water/oil/water (W/O/W) emulsion and a complex coacervate were investigated as a means of protection for post-emergent foliar application of the bioherbicide onto scentless chamomile. Dew period or the residence time of atmospheric moisture condensate on the aerial parts of plants is required for the bioherbicide agent to penetrate but this condition is frequently deficient on the Canadian prairies. Therefore, a misting system was designed to ensure minimum wetness duration on the plant surfaces after field applications. City water supply provided a head pressure of 2.8-3.5 kg/cm^2 (40-50 psi) to a solenoid valve controlled by a Campbell Scientific CR10X datalogger. Wetness sensor grids, placed within the experimental plots, total area about 200 m^2, instructed the datalogger to activate the moisture misting through Rain Bird micro-bird spinners elevated about 1 m above the plant canopy when dew or leaf wetness was lacking. With the leaf wetness meeting the minimum requirement, experimental formulations with bioherbicides could be examined more reliably. Weed control efficacy of the formulation was determined on scentless chamomile at the 6-8 leaf stage both under greenhouse and field conditions. In addition, the synergistic effect between the *C. truncatum* formulation and the herbicide Sencor® was validated in the field. Here, our new approach to formulating *C. truncatum* in a complex coacervate and its value in maintaining the efficacy of bioherbicide controlling scentless chamomile under field conditions are discussed.

Tuesday November 27th, 2007
Session 1C – Horticulture and special crops

ORAL PRESENTATIONS

Time	Title	Speaker
17.15 – 17:30	Flumioxazin: A new preemergence tool for broadleaf weed control in horticultural crops.	Beth Connor
17.30 – 17:45	Tank-mixing strobilurin fungicides with metribuzin, thifensulfuron and rimsulfuron in tomato.	Darren Robinson
17:45 – 18:00	Development of strategies for weed control in strawberries.	Victoria Brookes.

POSTER PRESENTATIONS

Title	Authors
Expanding weed control options in strawberry production	Brookes, V.R and McMillan, G.A.
Expanding weed control options in cranberry production.	McMillan, G.A., Coukell, G.B.
Minor Use Pesticide Program, Agriculture and Agri-Food Canada.	Trudeau M., and Jobin T.
Effect of time of application on cole crop tolerance to topramezone and pyroxasulfone.	Robinson, D.E. and McNaughton, K.

Flumioxazin: A new preemergence tool for broadleaf weed control in horticultural crops. Connor B., Engage Agro Corporation, Guelph, Ontario.

Flumioxazin is a new Group 14 herbicidal active ingredient that provides residual control of susceptible weeds in dry bulb onion, potato, sweet potato, strawberry, asparagus, tree fruit, grape, and highbush blueberry. Once activated by water, flumioxazin provides preemergence control of selected grass and broadleaf weeds by inhibiting protoporphyrinogen oxidase, an essential enzyme required by plants for chlorophyll biosynthesis. For dry bulb onion, multiple applications at the 2-leaf to 6-leaf stage were tested, with a minimum of 14 days between applications, applied at a rate of 35.7-71.4 g ai ha^{-1}, with a maximum seasonal application rate of 107.1 g ai ha^{-1}. For potato, one application of flumioxazin per season was tested at a rate of 53.6 g ai ha^{-1}; applications were made to the soil surface immediately after hilling when a minimum of 5 cm of soil was covering the vegetative portion of the potato plant. For sweet potato, one application of flumioxazin per season was tested, at a rate of 89.3 g ai ha^{-1}; applications were made to the soil surface 2 to 5 days prior to transplanting sweet potato. For strawberry, one application of flumioxazin per season was tested, at a rate of 107.1 g ai ha^{-1}; applications were made to dormant strawberries or as a shielded, directed spray to row middles. For dormant asparagus, one application of flumioxazin per season was tested at a rate of 285.6 g ai ha^{-1}. For tree fruit, grape, and highbush blueberry, two applications per season, with a minimum of 30 days between applications, were tested at rates of 214.2-428.4 g ai ha^{-1}; applications were directed towards the soil surface and shielded from crop foliage. Results showed that flumioxazin provided excellent control of pigweed, ragweed, common lamb's-quarters, and nightshade; higher use rates provided longer residual control. All tested crops were tolerant to flumioxazin.

Tank-mixing strobilurin fungicides with metribuzin, thifensulfuron and rimsulfuron in tomato. Robinson, D.E.[1] and Nurse, R.[2] [1]Department of Plant Agriculture, University of Guelph, Ridgetown, ON, and [2]Agriculture and Agri-Food Canada, Harrow, ON.

Trials were conducted at two locations in southwestern Ontario from 2004 to 2006 to compare the effect of tank-mixing strobilurin fungicides with tomato herbicides on weed control, tomato visual injury, and tomato yield. In each trial, one half of each plot was kept weed-free by handweeding to test for visual injury and tomato tolerance to herbicides alone. The other half of each plot was not hand-weeded to determine the level of weed control of each treatment, and the effect of competition on tomato yield. Treatments included rimsulfuron (15 and 30 g a.i. ha^{-1}), thifensulfuron (6 and 12 g a.i. ha^{-1}), metribuzin (150, 300, 600 g a.i. ha^{-1}), rimsulfuron+metribuzin (15+150 and 30+300 g a.i. ha^{-1}), or thifensulfuron+metribuzin (6+150 and 12+300 g a.i. ha^{-1}) alone or with either azoxystrobin (75 g a.i. ha^{-1}) or pyraclostrobin (110 g a.i. ha^{-1}). Untreated weed-free and weedy checks were included for comparison. Adding azoxystrobin or pyraclostrobin to rimsulfuron or metribuzin (150 and 300 g a.i. ha^{-1}) did not cause significant visual injury, however there was some injury (5%) when 600 g a.i. ha^{-1} Sencor was tank mixed with either fungicide. Adding azoxystrobin to thifensulfuron did not cause significant visual injury, while adding pyraclostrobin to thifensulfuron did result in commercially significant visual injury. Despite this, adding pyraclostrobin to thifensulfuron did not delay maturity or reduce yield. The addition of azoxystrobin or pyraclostrobin to metribuzin, thifensulfuron or rimsulfuron did not reduce weed control compared to the herbicides applied alone.

Development of strategies for weed control in strawberries. Brookes, V.R. Agriculture and Agri-Food Canada, PARC-Agassiz,B.C.

The cost of weeding is the main deterrent in the strawberry industry in British Columbia. The competition with berries imported from California, Mexico and now China with access to cheaper labour have made it very difficult for strawberry growing to be economically viable. The industry has changed and more than half of the berry production is for fresh market sales direct from the farm and the rest for processing. In the last ten years the area used for strawberry production in B.C. has been reduced by about 50% mainly due to the high cost of production. The main cultivar grown is also changing; Totem had been the main variety since the mid 1970s; in 2007 Puget Reliance became the most commonly planted variety planted. Totem has been fairly sensitive to herbicide treatments while Puget Reliance appears to be more tolerant. The loss of chloroxuron (Tenoran) many years ago still leaves a void in weed control options for strawberries. There are no effective and crop tolerant post-emergence herbicides available. Broad leaved weed control options have not changed much since the original herbicides were registered over 30 years ago. Trial work carried out and priority products identified through the Canadian minor use program will expand the future products that will be available. Trials have included sulfentrazone, flumioxazin, napropamide, oxyflourfen, s-metolachlor, terbacil and simazine either alone or in various combinations. The use of black plastic mulch for weed control has increased and is utilized in day-neutral variety plantings. In 2007 more than 20% of the new plantings were day neutral. A broad spectrum pre-emergence herbicide application is used between rows only for weed control. Better options for weed control options is the number one priority for the strawberry industry in B.C.

Expanding weed control options in strawberry production. Brookes, V.R[1] and McMillan, G.A.[2]
[1]Agriculture and Agri-Food Canada, PARC-Agassiz,B.C.; [2] Intergrated Crop Management Services Inc. (ICMS), Abbotsford, B.C.

Broadleaf weed control during the establishment year of strawberry can be a limiting factor for proper crop establishment which can lead to yield reduction in the following fruiting years. Few herbicides are currently registered for weed control and they belong to groups that are known for resistance build up and only one tank mix option exists between the products. In 2007, trials in Abbotsford and Agassiz, BC were carried out on newly planted strawberry cultivars ‘Puget Reliance’ and ‘Totem’ to identify new herbicides and tank mix combinations for weed control. The herbicides included sulfentrazone, flumioxazin, napropamide, oxyflourfen, s-metolachlor, terbacil and simazine either alone or in various combinations. Very slight crop injury was observed to sulfentrazone and flumioxazin at the Abbotsford site at the first rating while the tank mixes of sulfentrazone + oxyflourfen and oxyflourfen + s-metolachlor and to a lesser extent flumioxazin + sulfentrazone resulted in some necrosis and reduced plant growth at the Agassiz site. Flumioxazin reduced plant growth in Totem but did not affect Puget Reliance. Flumioxazin and sufentrazone appeared weak on lady s-thumb control but had fairly good control of lamb s-quarters, shepherd s purse, corn spurry and chickweed. The mixtures of sulfentrazone + oxyflourfen, flumioxazin + sulfentrazone, flumioxazin + terbacil, oxyflourfen + s-metolachlor, sulfentrazone + terbacil and sulfentrazone + pendimethalin resulted in the best weed control at Abbotsford. Except for some chickweed escaping in sulfentrazone + terbacil the same treatments plus flumioxazin alone, sulfentrazone + napropamide, sulfentrazone + s-metolachlor, flumioxazin + napropamide, and pendimethalin + flumioxazin resulted in good weed control at Agassiz. Most treatments containing the industry standard napropamide consistently had lower weed control and were the first to break in weed control. Supporting trial work is required to confirm crop tolerance and to determine if the rates in the mixtures could be further reduced to improve crop tolerance and still result in effective weed control.

Expanding weed control options in cranberry production. McMillan, G.A.[1], Coukell, G.B.[2]
[1]Integrated Crop Management Services, Inc.(ICMS), Abbotsford, BC; [2]ICMS-Portage la Prairie, MB

Weeds are one of the major factors that impact yield in cranberry production. Few products are registered and only one is applied as a broadcast application, all other products are early spring applications or spot spray applications. As the result, late season weeds are becoming a major problem with very little control options available. In 2007, four field trials were conducted in British Columbia with the objectives to expand weed control options for cranberry producers by providing data to expand the Canadian Callisto (mesotrione) label, and to screen additional herbicides for broadleaf and grassy weed control. Across all four trials, the cranberry cultivar 'Stevens' showed minor crop injury (<3%) from Ultim (nicosulfuron + rimsulfuron) at 8 days after application. Crop tolerance was excellent with single applications of Puma Super (fenoxaprop-p-ethyl), Axial (pinoxaden), Accent (nicosulfuron) and Horizon (clodinafop propargyl) as well two applications of Callisto or Ultim applied alone or tank mixed. Two applications of Callisto controlled buttercup (*Ranunculus bulbosus)*, cleavers (*Galium aparine)*, Asters (*Aster spp*), common vetch (*Vicia sativa)* and white clover (*Trifolium repens)* and suppressed goldenrod (*Solidago sp)* with regrowth occurring in the plots at later assessments. One or two applications of Ultim controlled buttercup, white clover, cleavers, and common vetch. Tank mixing Callisto and Ultim heightened weed control early in the study but did not differ from the non tank mix applications by the end of the trial period. Puma Super, Axial, Ultim and Horizon controlled barnyard grass (*Echinochloa crusgalli)*, witchgrass (*Panicum capillare)*, yellow foxtail (*Pennisetum glaucum)* and large crabgrass (*Digitaria sanguinalis).*

Minor Use Pesticide Program, Agriculture and Agri-Food Canada. Trudeau M., and Jobin T.
Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, QC.

The Minor Use Pesticide Program (MUPP) was launched in June 2002 as a joint initiative between AAFC and Health Canada's Pest Management Regulatory Agency (PMRA), with a Government of Canada funding commitment of $54.5 million over six years. Under the program, AAFC is conducting field trials and laboratory analysis to obtain the required data for the registration of new minor uses of pesticides. These efforts provide growers with access to newer and safer pesticides to manage insects, diseases and weeds and are helping Canada's producers to compete in global markets. The AAFC Minor Use Pesticide Priority-Setting Workshop is held annually, usually in March, to determine national priorities. Representatives from a broad range of stakeholder groups - including provincial minor use coordinators, growers, the pesticide industry, crop specialists, as well as representatives from the U.S. IR-4 program and provincial and federal governments – attend the workshop. Recently, collaboration between the MUPP and IR-4 has increased greatly. The appropriate data is jointly accumulated in Canada and the United States, with submissions made to respective pesticide regulatory agencies concurrently (PMRA and the U.S. EPA). This saves time by reducing duplication of data collection activities. Through these efforts, growers on both sides of the border with the same crop/pest problems can have new uses of crop protection products registered in both countries simultaneously. Since 2003, 87 joint Canada/U.S. minor use projects have been undertaken. From 2003 to 2007, a total of 391 projects were initiated by the MUPP and of those 107 projects were completed, 80 were submitted and 27 were withdrawn. In 2007, 36 priorities were selected at the annual priority meeting which leaded to 43 projects being initiated. Another 25 projects were joint IR-4 / AAFC projects. Finally, 3 «A» priorities without solutions were retained from which derived a number of screening trials.

Effect of time of application on cole crop tolerance to topramezone and pyroxasulfone. Robinson, D.E. and McNaughton, K. Department of Plant Agriculture, University of Guelph, Ridgetown Campus, Ridgetown, ON.

Six trials were conducted in 2006 and 2007 to determine the tolerance of broccoli, cabbage and cauliflower to pre-transplant (PRE-T) and post-transplant (POST-T) applications of topramezone (at 18.75 and 37.5 g ai.i ha^{-1}) and pyroxasulfone (at 209 and 418 g a.i. ha^{-1}). All trials were kept weed-free to assess the effect of herbicide treatment alone on visual injury, plant stand, head size and marketable yield. An untreated, weed-free check was included for comparison with herbicide treatments. In both years, PRE-T applications of topramezone did not cause visual injury to any of the crops, nor did they reduce head size or yield. However, when topramezone was applied POST-T it caused bleaching, leaf necrosis and stunting, and reduced head size and yield at the 37.5 g a.i. ha^{-1} rate in all cole crops in both study years. In one year of study, pyroxasulfone applied PRE-T caused slight stunting at 418 g a.i. ha^{-1} in broccoli, but did not reduce broccoli head size or yield. In cabbage, however, pyroxasulfone applied PRE-T caused commercially unacceptable visual injury at 418 g a.i. ha^{-1}, and resulted in a reduction in head size and yield in both study years. In cauliflower, pyroxasulfone applied PRE-T caused commercially unacceptable visual injury at both rates and resulted in a yield reduction, though head size was not affected. POST-T applications of pyroxasulfone caused significant visual injury to all three cole crops in both study years. Injury included stunting, leaf distortion and necrosis. Though stand counts were unaffected, many plants did not produce heads - both average head size and yield were reduced by POST-T applications of pyroxasulfone. Topramezone and pyroxasulfone do not have an adequate measure of tolerance to proceed with registration, and soil residues may impact cole crops planted in subsequent years, therefore recropping studies have been initiated.

Graduate Student Presentations
Agenda
Wednesday, November 28th, 2007

Time	Title	Speaker	Affiliation
7:30 – 7:45	Effect of the environment and herbicides on the quantity of covered grains in naked oat (*Avena sativa* var. *nuda*)	Nathalie Lanoie	Laval University
7:45 – 8:00	Cumulative herbicide stress in corn and soybean	Lynette Brown	University of Guelph
8:00 – 8:15	L'utilisation du seigle d'automne (*Secale cereale* L.) comme moyen de lutte contre les mauvaises herbes dans les cultures maraîchères	Amélie Bilodeau	Laval University
8:15 – 8:30	Greenhouse bioassay to determine impact of mesotrione residues on vegetable crops	Rachel Riddle	University of Guelph
8:30 – 8:45	Effects of reduced rates of glyphosate and glufosinate on weed control in corn and soybean	Sébastien Rouane	Laval University
8:45 – 9:00	Exploring the mechanisms underlying the critical period for weed control in *Zea mays* (L.)	Eric Page	University of Guelph
9:00 – 9:15	Investigating barley (*Hordeum vulgare* L.) competiveness with weeds: an analysis of phenotypic variation	David A. Van Dam	University of Guelph
9:15 – 9:30	Weed community responses to crop residues	Christie Stewart	University of Western Ontario
9:30 – 9:45	The interaction between soil nitrogen levels and velvetleaf (*Abutilon theophrasti* Medic.) densities on glyphosate and glufosinate efficacy	Daryl Vermey	University of Guelph
9:45 – 10:00	Optimizing weed control timing for lentil (*Lens culinaris* Medik.)	Leah Fedoruk	University of Saskatchewan
10:00 – 10:30	Health Break		
10:30 – 10:45	Fall rye (*Secale*) cover crops suppress weeds in edible bean production	Heather Flood	University of Manitoba
10:45 – 11:00	Can crop height and density be used to reduce flowering synchrony and intraspecific gene flow between cropped and volunteer wheat (*Triticum aestivum* L.)?	Christian Willenborg	University of Manitoba
11:00 – 11:15	The effect of genotype on the ferality of volunteer *Brassica napus* (canola)	Nicole Seerey	University of Saskatchewan
11:15 – 11:30	Volunteer triticale (X *Triticosecale* Wittmack) control and fecundity in following crops	Lisa Raatz	University of Alberta
11:30 – 11:45	Crop rotation, seeding rate and herbicide rate effects on wild oat (*Avena fatua* L.) density, seasonal emergence patterns and seed viability	Kristina Polziehn	University of Alberta
11:45 – 12:00	Influence of cereal crop competition on volunteer wheat (*Triticum aestivum* L.) fecundity	Ryan Louis Nielson	University of Alberta
12:00 – 12:15	Intraspecific pollen mediated gene flow in flax (*Linum usitatissimum* L.)	Amit Jhala	University of Alberta
12:15 – 12:30	The influence of pre-emergent and post-emergent herbicides on the fecundity of volunteer flax (*Linum usitatissimum* L.) in wheat (*Triticum aestivum* L.)	Jody Dexter	University of Alberta

Effect of the environment and herbicides on the quantity of covered grains in naked oat (*Avena sativa* var. *nuda*). Lanoie, N.[1], Vanasse, A.[1], Collin, J.[1], Frégeau-Reid, J.[2], Pageau, D.[3], Lajeunesse, J.[3], Durand, J.[4] [1]Department of phytology, Laval University, Quebec, QC; [2]Agriculture and Agri-Food Canada (AAFC), Ottawa ON; [3]AAFC-Normandin, QB; [4]Semican inc., Princeville, QC.

With hulless grains and higher nutritional value, naked oats are able to generate many niche markets. Naked oats harvested in Quebec however, have on average 10% but up to 40% of covered grains. The objective of this study is to evaluate the effect of the environment, herbicides and their application stage on the quantity of covered grains in naked oat. During two years, nine lines known to express genetic variability for naked grain characteristics were evaluated at four experimental sites in the province of Quebec. At each site, those lines were treated with three types of herbicides: Bromoxynil/MCPA, Dicamba/MCPA and Thifensulfuron methyl/Tribenuron methyl and compared with a hand weeded check. The herbicides were applied at the same growing stage (12-13 of Zadoks). In another trial, we applied herbicides on three lines at two growing stages: Zadoks 12-13 and 22-23. The results of 2006 showed that the proportion of covered grains was more important at one site (2.3 % higher) for all the lines tested and the herbicides applied. Furthermore, Dicamba/MCPA applications increased by 2.1 % on average the proportion of covered grains compared to the other treatments. The application of this herbicide at the 22-23 Zadoks stage raised this value to 3.2% on average compared to the earlier stage. Lines that produced few covered grains as observed in the hand weeded treatment were not very affected by the Dicamba/MCPA application. There were no significant differences between the other weeding treatments for the proportion of covered grains. The results suggest that we can reduce the proportion of covered grains by growing lines less susceptible to produce them. Since Dicamba/MCPA has an impact on the phenotypic expression of the grains, it would be interesting to evaluate if it has an influence on the nutritional value of naked oats.

Cumulative herbicide stress in corn and soybean. Brown, L. R.[1], Robinson, D. E.[1], Swanton, C. J.[1], Nurse, R. E.[2], Loux, M. M.[3], Johnson, W.G.[4], Young, B.G.[5], Sikkema, P. H.[1] [1]Department of Plant Agriculture, University of Guelph, Guelph, ON; [2]Agriculture and Agri-Food Canada, Harrow, ON; [3]Department of Horticulture and Crop Science, Ohio State University, Columbus, Ohio; [4]Department of Botany and Plant Pathology, Purdue University, West Lafayette, Indiana; [5]Department of Plant, Soil and General Agriculture, Southern Illinois University, Carbondale, Illinois

Anecdotal accounts of possible synergistic responses between herbicide drift and the application of registered herbicides have been suggested by field crop producers. These producers thought that herbicide drift, prior to the application of registered herbicides, accentuated injury in field corn and soybean. Experiments were conducted to evaluate the influence of simulated glyphosate drift on corn and mesotrione or dicamba/diflufenzopyr drift on soybean followed by registered herbicides. Thirteen field experiments were conducted over a three-year (2005-2007) period in Ontario and the U.S. to determine the effect of simulated glyphosate drift followed by the application of nicosulfuron/rimsulfuron plus dicamba/diflufenzopyr or foramsulfuron plus bromoxynil plus atrazine. Overall, there was a trend towards increased crop injury and decreased height and yield with increasing rates of glyphosate drift alone and in combination with the in-crop herbicides. In soybean, six field experiments were conducted over three years (2005-2007) in Ontario to determine the effects of simulated mesotrione drift followed by the application of glyphosate, imazethapyr, bentazon or chlorimuron-ethyl. Crop injury increased and height decreased with increasing rates of mesotrione drift alone and in combination with the in-crop herbicides. However, injury became less pronounced as the season progressed. Yield was not affected by the combination of mesotrione drift followed by the in-crop herbicides. In soybean, five additional experiments were conducted in 2007 in Ontario to determine the effects of simulated dicamba/diflufenzopyr drift followed by the application of imazethapyr, bentazon or chlorimuron-ethyl. Preliminary results have shown that crop injury increased and height decreased with increasing rates of dicamba/diflufenzopyr drift alone and in combination with the in-crop herbicides. The results from these studies will allow for a better understanding and identification of cases where drift has caused accentuated crop injury.

L'utilisation du seigle d'automne (*Secale cereale* L.) comme moyen de lutte contre les mauvaises herbes dans les cultures maraîchères. Bilodeau, A. et Leroux, G.D. Département de phytologie, Université Laval, Québec, Qc

Le seigle d'automne apporte une certaine répression des mauvaises herbes par la présence physique de sa culture et de ses résidus. De plus, c'est une céréale reconnue pour son activité allélopathique; elle relâche des toxines naturelles à partir de ses tissus vivants et de ses résidus en décomposition. Les objectifs de cette recherche sont de déterminer l'efficacité du seigle à réprimer les mauvaises herbes dans les cultures maraîchères ainsi que d'évaluer ses effets sur le développement de ces cultures. La variété de seigle « Gauthier » a été ensemencée à deux périodes de l'année, à l'automne 2006 et au printemps 2007. Ensuite, il a été détruit à la mi-juin par des procédés physiques et chimiques de destruction avant l'implantation de cinq cultures maraîchères : le maïs sucré, le concombre, le haricot, le brocoli et le chou. Les procédés de destruction utilisés sont : l'application de glyphosate ou de séthoxydime à pleine ou à demie dose, le fauchage, le motocultage, le passage d'un rouleau crêpeur et la combinaison de certaines de ces méthodes. Le seigle semé à l'automne a procuré une meilleure répression des adventices que le seigle semé au printemps. La destruction du seigle semé à l'automne par le rouleau crêpeur et le fauchage, laissant à la surface du sol un paillis important, a procuré un désherbage supérieur aux autres méthodes. Les cinq cultures maraîchères ont été affectées négativement par la présence d'un paillis de seigle, dans l'ordre croissant : haricot < concombre < chou,brocoli < maïs. Un retard de croissance, des plants moins bien développés et une diminution des rendements ont été observés. Les résultats de cette recherche montrent que l'utilisation d'un couvert de résidus de seigle à la surface du sol apporte une répression importante des mauvaises herbes, mais affecte négativement le développement des cultures maraîchères implantées.

Greenhouse bioassay to determine impact of mesotrione residues on vegetable crops. Riddle, R., O'Sullivan, J., and Swanton, C.J. Department of Plant Agriculture, University of Guelph, Guelph, ON

Mesotrione is a HPPD-inhibiting herbicide registered for broadleaf weed control in corn. Mesotrione residues can cause injury to sensitive crops grown in rotation. Bioassays are often used to determine the presence of phytotoxic levels of herbicide residues in the soil. To determine the relative sensitivities of sugar beets, cucumbers, green beans, peas and soybeans to mesotrione residues, greenhouse bioassays and field experiments were conducted at the Simcoe Research Station, Simcoe, Ontario. Mesotrione was applied preemergence to corn in the spring of 2005 and 2006 at 0, 70, 140 (1X), 280, 420 and 560g ha^{-1}. In the spring of 2006 and 2007, the above crops were planted in the mesotrione treated soil. Eight cored soil samples, at a depth of 15 cm were taken from the untreated field plots prior to planting in the spring of 2006 and 2007. This soil was spiked with six concentrations (PPB) of mesotrione. Soil was weighed into cups, and crops were planted and placed into the greenhouse. For the second greenhouse bioassay, soil samples were collected from treated and untreated plots in the field trial. Experiments were arranged in a randomized complete block design with four replications. Visual injury ratings (0 to 100% scale) were recorded and plants were harvested. The bioavailability of mesotrione residues in the field soil was estimated by comparing the response of test plants grown in the greenhouse, in soil taken from the field, with standard dose response curves developed from greenhouse bioassays. Injury and growth reduction in the greenhouse was also compared to the injury and growth reduction in the field. Greenhouse bioassays reflected yield and growth reduction observed in the field. Sugar beets were the most sensitive crop followed by green beans, peas, cucumbers and soybeans.

Effects of reduced rates of glyphosate and glufosinate on weed control in corn and soybean. Rouane, S.[1], Leroux, G.D.[1] and Simard M.-J.[2] [1]Département de phytologie, Université Laval, Québec, QC; [2] Agriculture et Agroalimentaire Canada, Québec, QC

Avec l'avènement des cultures transgéniques résistantes aux herbicides, le glyphosate et le glufosinate sont de plus en plus utilisés dans la culture du maïs et du soya. Leur excellente efficacité et leur large spectre d'action font de ces herbicides de puissants outils de désherbage. Utilisés en alternance, ces herbicides permettent de prévenir l'apparition de résistance chez les mauvaises herbes grâce à leurs modes d'action différents. L'utilisation de doses réduites présente donc un potentiel intéressant, d'autant plus que leur toxicité est relativement faible comparativement aux herbicides couramment utilisés dans la culture du maïs. Afin de tester l'efficacité des doses réduites, une combinaison factorielle comprenant les deux herbicides, quatre doses (0X, 1/2 X, 3/4X et 1X), deux cultures (maïs et soya) et huit rotations herbicides/cultures de trois années, a été mise en place en 2006. L'objectif étant d'évaluer les interactions entre tous ces facteurs et d'établir une stratégie optimale de désherbage d'un point de vue agronomique, environnemental et économique. Après une année de culture, les deux herbicides présentaient des différences significatives pour le contrôle des graminées annuelles. La densité et la biomasse des graminées annuelles étaient supérieures ($P<0,05$) dans les traitements de demi-dose de glufosinate, comparativement à la pleine dose et aux traitements de glyphosate. Les rendements du maïs se sont avérés inférieurs ($P<0,05$) dans les traitements de glufosinate à demi-dose. Les doses réduites de glyphosate n'ont engendré aucune augmentation significative de la densité et de la biomasse des mauvaises herbes, ni de réduction de rendements. Pour l'instant, l'utilisation deux années de suite de la demi-dose de glyphosate reste la solution la plus intéressante de par son efficacité, son faible coût et son faible impact environnemental.

Exploring the mechanisms underlying the critical period for weed control in *Zea mays* (L.). Page, E.R., Tollenaar, M.T., Lee, E.A., Lukens, L. and Swanton, C.J. Department of Plant Agriculture, University of Guelph, Guelph, ON.

Previous research has demonstrated that early season weed interference can significantly affect maize (*Zea mays* L.) growth, development and yield. It has been hypothesized that early detection of weeds through reflected light quality (i.e. the ratio of red to far-red light or R:FR), may be an important mechanism affecting the onset and outcome of crop-weed competition. The objectives of this research were to quantify the impact of early season weed interference on maize growth and development during the critical period for weed control. A maize hybrid was grown in a greenhouse under ambient and reduced R:FR conditions, simulating weed-free and weedy conditions, respectively. These light quality environments were established by planting maize seeds in pots surrounded by turface (a baked clay medium with high or ambient R:FR) or commercial sod (low R:FR), such that there was no below ground competition. Using these two light environments, a classical critical period experiment was conducted with weed-addition and -removal series. Five weedy or weed-free durations were used in each series (E.g. Weed removal series: 0, 3, 6, 9, 12 or 15 days weedy). Maize seedlings were harvested 15 days after emergence. Seedling biomass and leaf area decreased linearly as the duration of weed competition increased in the weed-removal series. In contrast, weed addition following a weed free period had little impact on either of these parameters. These results suggest that the detection of weedy competitors occurs during the very early stages of maize development (~3-4 leaf tips). Furthermore, effective weed control at or near the time of crop emergence may reduce the impact of subsequent weed emergence events.

Investigating barley (*Hordeum vulgare* L.) competiveness with weeds: an analysis of phenotypic variation. Van Dam, D.A. and Swanton, C.J. Department of Plant Agriculture, University of Guelph, Guelph, Ontario.

Weed-competitive cultivars are those which 1) maintain a higher percentage of their potential yield when grown in the presence of weeds, and 2) possess an ability to suppress weeds. To date, research has been unable to identify a key morphological trait correlated with competitive ability that is selectable within a barley breeding program. The objectives of this study were to test an early screening method for selecting competitive germplasm within a barley breeding program. Analyses were conducted on the relationship between competitive ability of seven barley cultivars within replicated field trials and their morphological responses to an early weed-induced low light quality environment within a growth cabinet. The results showed that barley cultivars can be ranked for their respective competitive ability against weeds. In field trials, cv. OAC Kippen and cv. Brucefield were the most and least competitive cultivars, respectively. Cultivars also differed in their shade avoidance response to the weed-induced low light quality treatments. Leaf length, particularly that of the third leaf, showed strongest association with competitiveness. Selecting for longer leaves on seedling barley plants may improve competitiveness within breeding lines and promote greater efficiency within a breeding program.

Weed community responses to crop residues. Stewart, C.L., and Cavers, P.B. Department of Biology, University of Western Ontario, London, ON.

In weed communities in no-till fields, many changes occur directly or indirectly in response to the presence of crop residues on the soil surface. We examined weed seedling recruitment from a known seed bank in response to varying types of crop residue (corn/soybean/wheat) in combination with different amounts of residues, representing variations found in field situations. Greenhouse experiments were performed using three seed cohorts of five annual broadleaf weeds and two annual grasses. Results differed significantly from year to year; therefore the data for each year were analyzed separately. In 2004, crop residue type affected the percent emergence of common ragweed (*Ambrosia artemisiifolia* L.), lamb's-quarters (*Chenopodium album* L.) and barnyard grass (*Echinochloa crusgalli* (L.) Beauv.). Crop residue amount affected the percent emergence of common ragweed and lamb's-quarters. Interaction effects between residue type and amount were found for common ragweed, redroot pigweed (*Amaranthus retroflexus* L.) and lamb's-quarters. In 2005, crop type did not affect any species, while the amount of residue and its interaction with crop type affected emergence of redroot pigweed, lamb's-quarters, lady's thumb (*Polygonum persicaria* L.) and barnyard grass. In 2006, common ragweed and lady's thumb were affected by residue type. All species except barnyard grass were affected by the amount of crop residue. Interaction effects between crop residue type and amount on percent emergence were found for common ragweed, velvetleaf (*Abutilon theophrasti* Medik.), lamb's-quarters and yellow foxtail (*Setaria glauca* (L.) Beauv.). Generally, increasing the amount of crop residue decreased weed seedling emergence, as predicted. However, in some cases, crop residues stimulated seedling emergence. Each species responded individually to the treatments and often differed from year to year. These findings emphasize the importance of understanding the biology of weeds and their responses to microsite variation resulting from the presence of crop residues in no-till fields.

The interaction between soil nitrogen levels and velvetleaf (*Abutilon theophrasti* Medic.) densities on glyphosate and glufosinate efficacy. Vermey, D.J., Robinson, D.E., Swanton, C.J. Department of Agriculture, University of Guelph, Guelph, ON

Reports of herbicide resistant weeds have been increasing. However, observations of decreased activity may be due to poor herbicide efficacy rather than resistance. Herbicide activity may decrease because of unfavorable environmental conditions, absence of a surfactant, poor sprayer calibration, differences in soil nitrogen (N) availability, or high weed density. This study examined two such possibilities for decreased efficacy of glyphosate and glufosinate on velvetleaf (*Abutilon theophrasti* Medic.): N availability and weed density. The experiment was a split-plot with four replications. In a growth room, 10 cm^2 pots were seeded with either 1 or 10 velvetleaf seedlings and given either 15 or 150 kg ha^{-1} of urea N (46-0-0). Injury ratings were taken at 7 and 14 days following herbicide application and a biomass harvest occurred 14 days after spraying. Glufosinate at 400g a.i. ha^{-1} controlled the high density - high N plants by 80% and the high density - low nitrogen plants by 70%. Whereas at low density, glufosinate controlled both high and low N plants by 90%. Glyphosate at 900g a.i. ha^{-1} controlled high density - high N plants by 70%; but, only 50% control was observed for the high density - low N plants. When glyphosate was applied to low density plants, control was 85% and 75% for high N and low N plants, respectively. This research could allow producers to predict the areas in a field where glufosinate and glyphosate could have less efficacy. Therefore, doses of these herbicides may need to be adjusted because of the soil N content, which would encourage site-specific management based on soil sampling and field scouting. Potentially, weed escapes may be prevented by adding an adjuvant to the spray solution for use in areas where there is a high weed density and low soil N.

Optimizing weed control timing for lentil (*Lens culinaris* Medik.). Fedoruk, L.K. and Shirtliffe, S.J. Department of Plant Sciences, University of Saskatchewan, Saskatoon, SK.

Lentil is an important pulse crop in Canada. However, weed control is important due to the crops poor competitive abilities and few herbicide options for conventional varieties. Imidazolinone tolerant lentil varieties allow for improved weed control with herbicides and later herbicide application timing. The research objective is to determine the lentil stages at which yield loss occurs as a result of weed competition and determine the appropriate weed control timing. The critical period of weed control is not known for lentil and was investigated at locations across Saskatchewan. This experiment had two sets of treatments, the first at which weeds were removed at five different lentil stages ranging from the 1 to 11 nodes. The second set of treatments were kept free of weeds until lentil stages ranging from 1 to 11 nodes and weed growth occurred after these stages. The results indicate that lentil experienced yield loss when weeds emerged and grew between the 6 and 10 node stages. Therefore the critical period of weed control for lentil is between these stages and to avoid yield loss the weeds must be removed by the 6 node stage and the crop must remain weed free until the 10 node stage.

Fall rye (*Secale*) cover crops suppress weeds in edible bean production. Flood, H.E., Entz, M.H. Department of Plant Science, University of Manitoba, Winnipeg, MB

The ability of certain plant to control their surroundings by suppressing the germination and growth of other plants has long been observed by farmers and scientists. The nature of these plant-to-plant effects (allelopathy) is less well known. Fall rye is recognized as a plant with allelopathic properties. Research on weed control benefits of fall rye cover crops has been conducted in several Canadian provinces. Fall rye cover crops are sometimes used in low residue crops to prevent soil erosion and improve soil

structure. The objective of the present study was to examine effects of fall rye cover crops on weed density and growth and yield of edible bean crops in Manitoba. Field experiments were conducted at four Manitoba locations in 2006 and 2007. Two rye termination times were used: Soil incorporation when rye produced low or high levels of biomass, varying across all four site years. Rye treatments resulted in 50 to 70% fewer broadleaved weeds and 25 to 60% fewer grass weeds at time of full bean soil emergence. Soil incorporation when rye produced greater biomass resulted in 25 to 40% fewer weeds compared to incorporation when rye produced less biomass. Bean yields under low residues levels were found to either increase or remain stable compared to no cover crop treatments. Bean yields were subsequently more affected at higher rye incorporation rates with losses averaged at 20%.
A secondary experiment involving the effects of crude aqueous rye extracts on three test species of green foxtail, redroot pigweed and navy beans were found to significantly reduce germination in redroot pigweed and green foxtail. Bean seed germination was not affected by the allelopathic effects of fall rye.

These results suggest that well managed rye cover crops provide weed suppression in an edible bean crop without inhibiting bean productivity.

Can crop height and density be used to reduce flowering synchrony and intraspecific gene flow between cropped and volunteer wheat (*Triticum aestivum* L.)? Willenborg, C.J.[1], Luschei, E.C.[2],Van Acker, R.C.[3] [1]University of Manitoba, Winnipeg, MB; [2]University of Wisconsin, Madison, WI; [3]University of Guelph, Guelph, ON

Volunteer wheat will be an inevitable facilitator of gene flow in bread wheat. Therefore, the potential to manipulate crop height and density in an effort to reduce flowering overlap and the frequency of gene flow was assessed in field experiments. Crop genotypes consisting of two tall genotypes (Amazon, Prodigy) and two semi-dwarfs (Oslo, Vista) were planted at densities ranging between 75 – 600 plants m^{-2}. Volunteers (CDC Imagine) were seeded at 30 plants m^{-2} in a paired-pollinator row plot study. The volunteers employed a herbicide resistance marker system (Clearfield®), which was used to detect hybrids in the F_1 generation and confirm these results in the F_2 generation. Analysis was conducted by fitting flowering synchrony and gene flow data to a series of nonlinear equations. Flowering synchrony between the crop and volunteers differed significantly among genotypes. Oslo exhibited approximately 50% less flowering synchrony than the other genotypes in three of four site-years. While crop density did not significantly affect flowering synchrony, growing a taller genotype increased flowering synchrony on average by 20%. Likewise, the probability of flowering overlap between cropped and volunteer wheat was substantially lower when short genotypes were grown as compared to tall genotypes. Gene flow declined exponentially with increasing crop density in all site-years, with the greatest reductions occurring when crop density was below 200 plants m^{-2}. Neither genotype nor differences in crop height affected gene flow in any site-year. Levels of gene flow did not exceed the European threshold of 0.9% in any case; the highest maximum predicted level of gene flow was 0.3%. These results demonstrate that although crop height and genotype can influence flowering synchrony between cropped and volunteer wheat, gene flow will be highest in situations where crop density reduced.

The effect of genotype on the ferality of volunteer *Brassica napus* (canola). Seerey, Nicole J, and Shirtliffe, S.J. Department of Plant Science, University of Saskatchewan, Saskatoon, SK.

Canola producers in Western Canada are increasing the frequency that herbicide tolerant hybrid canola varieties are grown in crop rotations, resulting in greater problems with volunteer canola. Three traits possessed by canola that allow volunteer plants to become problem weeds are; a strong competitive ability; large easy-shattering seed rain; and secondary dormancy. Hybrid F1 canola produces an F2 generation, as its progeny. Successive generations of volunteer canola can differ from their parents, and each other. F2 generations have been found to produce lower seed yields. To date, no research has been conducted on the seed production of volunteer canola in competition with crops. Furthermore, nothing is known of the impact of later generations of volunteer canola on field crops through competition and seed production. The objective of my research was to examine the fecundity and competitive ability of volunteer canola arising from F1 hybrids. One study conducted assessed the yield loss incurred by wheat when grown with different genotypes and generations of volunteer canola at varying densities. Preliminary results suggest that the F2 generations cause less yield loss than their F1 parents. A Second experiment conducted assessed seed production of different genotypes and generations of volunteer canola, when grown in competition with wheat. Seed output was more affected by environmental conditions than by genotype or generation.

Volunteer triticale (X *Triticosecale* Wittmack) control and fecundity in following crops. Raatz, L.L.[1,2], Topinka, A.K.[2], and Hall, L.M.[1,2] [1] Bio-Industrial Crops, Alberta Agriculture and Food, Edmonton, AB; [2] Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB.

Triticale is being considered as a crop for a number of bioproduct and industrial crop initiatives. Several of the potential products are predicated on the use of transgenic technologies. Research is required to fulfill regulatory biosafety requirements and for the development of best management practices including the control of volunteer triticale containing a novel trait. We determined the influence of pre-seeding and in-crop herbicides on volunteer triticale survival and fecundity in canola, pea, and wheat crops. Field trials were conducted at two locations in central Alberta in 2006 and 2007. Pronghorn spring triticale was seeded at 75 plants m^{-2} to simulate volunteer populations. Three herbicide application timings (pre-seeding, pre-seeding and in-crop, and in-crop only) were imposed on four following crops and compared to untreated checks. Control was assessed visually on a scale of 0-100. Three permanent 0.25 m^{-2} quadrats were established in each plot and triticale plant counts following pre-seeding treatments and at harvest, triticale biomass, triticale seed counts and weights, and crop biomass data were measured. Crop and triticale seed yields were also determined. In 2006 and 2007, triticale continued to emerge after pre-seeding treatments and plant numbers declined by 7 to 47% following pre-seed treatments, by 36 to 100% for pre-seed and in-crop treatments, and by 0 to 100% for in-crop applications only. However, subsequent triticale seed production was reduced by 71 to 94% following pre-seed treatments, 99 to 100% for pre-seed and in-crop treatments, and by 90 to 100% for in-crop treatments. Volunteer triticale is competitive and the best control is achieved in all cropping systems with both pre-seeding and in-crop treatments.

Crop rotation, seeding rate and herbicide rate effects on wild oat (*Avena fatua* L.) density, seasonal emergence patterns and seed viability. Polziehn, K.B.[1] , Harker, K.N.[2] , O'Donovan, J.T.[2], Clayton, G.W.[3], and Hall, L.M.[1,4] Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; [2]Agriculture and Agri-Food Canada (AAFC), Lacombe, AB; [3]AAFC-Lethbridge, AB; [4]Bio-Industrial Crops, Alberta Agriculture and Food, Edmonton, AB

Wild oats are a competitive annual grass weed on the Canadian prairies responsible for significant reductions in crop yield and quality. The adoption of integrated weed management systems to manage wild oat requires a comprehensive understanding of seed ecology, seasonal emergence and seed bank persistence. The influence of crop rotation, seeding rate and herbicide rate on wild oat seasonal emergence, density and seed viability were evaluated in three locations across Alberta in 2006, utilizing trials initiated in 2001 by AAFC. Rotations were composed of either a continuous barley cropping system or a rotation of barley-canola-barley-peas. Short or tall barley cultivars were seeded at recommended and double rates whereas canola was seeded at a recommended rate. Wild oat herbicides were applied at quarter, half and full recommended rates. In 2006, the trial was composed of canola in rotation and continuous barley. Preliminary results indicate that wild oat strongly utilized early spring moisture and warming soil temperatures, with the greatest emergence occurring in early spring. Cumulative effects from crop rotation, seeding rate and herbicide rate were effective in the reduction of wild oat populations. Wild oat densities were considerably reduced in the subsequent 2007 crop under crop rotation treatments compared to continuous barley rotation treatments. The control of wild oat through herbicides was evident in both continuous and crop rotation treatments. Wild oat densities were higher in treatments with quarter herbicide rates even when competitive crop cultivars were seeded at increased rates. Wild oat seed viability was reduced over the winter. Under crop rotation with competitive cultivars, increased seeding rates and half or full herbicide rates, the wild oat seed bank was significantly diminished. The results from this study will contribute to agronomic, economic and environmentally sustainable IWM strategies for wild oat control.

Influence of cereal crop competition on volunteer wheat (*Triticum aestivum* L.) fecundity. Nielson, R.L[1] and L.M. Hall[1,2]. 1Department of Agriculture, Food and Nutritional Science, University of Alberta, Edmonton, AB. 2Alberta Agriculture, Food and Rural Development (AAFRD) Edmonton, AB.

Wheat a major crop in western Canada and should genetically modified (GM) wheat be released, minimizing gene flow is important to reduce adventitious presence (AP) and maintain varietal purity. Controlling volunteer wheat with herbicides can minimize the movement of genes and AP. Currently, few herbicide options exist for the control of volunteer cereals in cereal crop rotations. Field studies were conducted to investigate the use of agronomic practices on the reduction of volunteer wheat fecundity in central Alberta in 2005 and 2006. In commercial fields containing volunteer wheat, barley and wheat crops were seeded at both early and late timings, with four seeding rates including a non-seeded check. Volunteer wheat plants were banded for later identification three times in the growing season and hand harvested at crop maturity to identify individual volunteer wheat survival, biomass and fecundity. Volunteer and crop anthesis synchronicity was recorded weekly throughout the growing season using the BBCH scale. Early emerging volunteer wheat fecundity (seeds plant $^{-1}$) and biomass was significantly reduced by seeding barley, a more competitive crop. For both wheat and barley crops the individual volunteer fecundity was significantly reduced by seeding the crop earlier. Later emerging volunteers had higher mortality and were less fecund. Increased seeding rates reduced volunteer fecundity over the unseeded checks and were most evident in barley. By controlling early emerging volunteers, volunteer seeds mediated gene flow would be reduced. Only late emerging volunteers did not flower synchronously with the seeded crops. The results from this study will make a significant contribution to gene flow modeling efforts.

Intraspecific pollen mediated gene flow in flax (*Linum usitatissimum* L.). Jhala A.J.[1], Topinka A.K.[1], McPherson M. A.[1] and Hall L. M.[1, 2] [1]Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton T6G 2P5, AB, Canada**;** [2]Alberta Agriculture and Food, 410 Agriculture / Forestry Building, University of Alberta, Edmonton T6G 2P5, AB, Canada

Flax is being evaluated as a platform crop for bio-industrial and bioproducts and several of these products are predicated on genetic modifications. One concern is pollen mediated gene flow from transgenic to commodity flax. Prior to commercial production of novel flax in Canada, information on the frequency of flax outcrossing is required. Outcrossing was detected in this study through the transfer of the dominant, xenia effect of high α-linolenic acid (high ALA) trait from AC McDuff to the low α-linolenic acid (low ALA) cultivar SP 2047. Trials were conducted at two locations (Ellerslie and Edmonton, AB) in 2006 and 2007. Each trial consisted of 20 x 20 m high ALA cultivar AC McDuff as the pollen donor, surrounded by a 120 x 120 m low ALA cultivar SP 2047 as a pollen recipient. Seeds were harvested from the pollen recipient plot at the different distances and directions from the pollen donor. They were screened in the laboratory for ALA content and high ALA seeds considered a product of outcrossing. Outcrossing declined rapidly with distance from the pollen source and was similar at both the sites. Preliminary results from over 1 million seeds screened from the 2006 trials indicate outcrossing at 0.1 m from the source population was 1.55 and 1.33% at Edmonton and Ellerslie, respectively. Outcrossing was below 0.17 and 0.05% at 4 m distance at Edmonton and Ellerslie, respectively. At 25 m, outcrossing was 0.006% at Edmonton and 0.003% at a mean distance of 35 m at Ellerslie. Rare outcrossing events were detected up to 35 m from the pollen source, but were not detected beyond this distance. Based on these small scale experiments, pollen mediated gene-flow from transgenic flax to commodity flax will occur at short distances but would be rare beyond 35 m. These results may be used by regulators and the industry to establish isolation distances to limit unwanted pollen mediated transgene movement.

The influence of pre-emergent and post-emergent herbicides on the fecundity of volunteer flax (*Linum usitatissimum* L.) in wheat (*Triticum aestivum* L.). J.E Dexter1and L.M Hall[12]. [1]Agricultural Food and Nutritional Sciences, University of Alberta, Edmonton, AB, [2]Alberta Agriculture and Food, Edmonton AB.

Flax (*Linum usitatissimum*) is being transformed to confer novel traits for bioproducts and prior to its cultivation in Canada, an environmental biosafety assessment is required. Co-mingling of transgenic flax seed during harvest of commodity crops is a concern. In Canada, few herbicides are registered for volunteer flax control in cereals. Field experiments were conducted at two locations in Alberta in 2006 and 2007 to examine the use of two pre-emergent (glyphosate, glyphosate plus tribenuron-methyl) and five post-emergent (fluroxypyr plus 2,4-D ester or MCPA ester or quinclorac, thifensulfuron-methyl plus tribenuron-methyl or 2,4-D ester or quinclorac) herbicides used alone and in combination to reduce co-mingling of flax seed in spring wheat. Pre-emergent application of glyphosate or glyphosate plus tribenuron-methyl or post-emergent application of fluroxypyr plus MCPA ester reduced flax densities from 37 plants m^{-2} to 4 plants m^{-2} in both sites and years. Glyphosate or glyphosate plus tribenuron-methyl followed by a post-emergent herbicide also reduced flax densities, with average densities ranging from 1 to 7 plants m^{-2}. Post-emergent application of either fluroxypyr plus MCPA ester or 2,4-D ester reduced the dry weight of flax from 107.58 g m^{-2} to 5.03 g m^{-2} and 3.03 g m^{-2} respectively in both sites and years. Flax seed production was highly variable and ranged from more than 4500 seeds m^{-2} to less than 10 seeds m^{-2} in untreated and herbicide treated plots, respectively. Post-emergent application of fluroxypyr plus 2,4-D LV ester reduced the viability of flax seed from 54.12% to 3.81% and reduced flax density from 37 to 2 plants m^{-2}. This study identified effective herbicides for the control of volunteer flax in wheat. If transgenic flax is cultivated in western Canada, volunteers may be effectively managed in wheat which could mitigate risk of seed-mediated gene flow.

Common ragweed : An agricultural and urban weed
L’herbe à poux : Un problème agricole et urbain

Symposium Session
Agenda
Wednesday, November 28, 2007

Time	Topic	Speaker	Affiliation
14:30 – 14:35	Local Arrangements	Diane Lyse Benoit	Agriculture and Agri-Food Canada- Saint-Jean-sur-Richelieu, Québec
14:35 – 14:40	Introduction	Danielle Bernier	Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
14:40 – 15:10	Common ragweed - #1 allergenic weed	Linda Pinsonneault	Direction de la santé publique, Agence de la santé et des services sociaux de la Montérégie, Longueuil, Québec
15:10 – 15:40	Sharing expertise to win the battle against ragweed - The Story of the *Table québécoise sur l’herbe à poux*	Renée Levaque	Ministère de la Santé et des Services Sociaux du Québec, Longueuil, Québec
15:40 – 16:10	How did common ragweed (*Ambrosia artemisiifolia* L.) spread in Québec? A historical analysis using herbarium records	Claude Lavoie	Université Laval, Québec, Québec
16:10 – 16:40	Cover crops for ragweed suppression along highways	Jean-Pierre Beaumont	Ministère des Transports du Québec, Montréal, Québec
16:40 – 17:10	Seedling emergence and flower phenology of ragweed : climate change indicators?	Diane Lyse Benoit	Agriculture et Agroalimentaire Canada- Saint-Jean-sur-Richelieu, Québec
17:10 – 17:40	Herbicide resistance in common ragweed: weed control implication / Résistance aux herbicides chez l’herbe à poux : impact sur les stratégies de répression	Gilles Leroux	Université Laval, Québec, Québec
17:40 – 17:55	Concluding Remarks	Danielle Bernier	Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec

Sharing expertise to win the battle against ragweed - The Story of the *Table québécoise sur l'herbe à poux*. Levaque, R. Équipe Santé et Environnement, Direction de santé publique de la Capitale-Nationale, Québec QC. renee.levaque@ssss.gouv.qc.ca

Over the last fifteen years, the public health network has been very active in promoting actions to better control the rapid expansion of ragweed on the Quebec territory. The pollen of this plant is responsible for allergic rhinitis in an ever growing number of persons. Actually, the latest results reveal that close to 17,5 % of the population is allergic to ragweed.

Local actions to control ragweed have rapidly spread out throughout Québec, where the plant is found. Four public health directions located in the most affected areas (Montréal, Montérégie, Lanaudière and Québec) have decided to set up the *Table québécoise sur l'herbe à poux* in order to facilitate contacts with partners and thus, improve the efficiency of the interventions.

Nowadays, the *Table* can count on the knowledge and expertise of 20 partners from the public health field, as well as from provincial and federal ministries, municipal and agricultural producers groups as well as owners of large pieces of land.

During the presentation, the objectives of the *Table* as well as the interventions and accomplishments over the years will be described. The *Table* is now at a strategic point in its evolution and the coming years will be challenging. These challenges will be presented as well.

How did common ragweed (*Ambrosia artemisiifolia* L.) spread in Québec? A historical analysis using herbarium records. Lavoie, C., Jodoin, Y., and Goursaud de Merlis, A. Centre de recherche en aménagement et développement**,** Université Laval**,** Quebec City, QC

In this study, we reconstructed the spread of common ragweed (Asteraceae) in Southern Québec using herbarium specimens to document whether the habitat preferences of this plant shifted through time. Herbarium specimens stored in the main herbaria of southern Québec were used to reconstruct the spread of common ragweed. All data (sampling location, year of sampling, habitat characteristics, etc.) were incorporated into a geographical information system. Maps indicating the spatial distribution of common ragweed were produced for four time periods. The cumulative number of locations was plotted against time to construct invasion curves. The sequence of habitats where herbarium specimens were collected was also reconstructed. A database incorporating 707 common ragweed herbarium specimens was constructed for this study. The spread of common ragweed in most regions of southern Québec was initiated at the beginning of the 20th century. Herbarium specimens suggest that common ragweed first spread along river corridors. Specimens of common ragweed were not collected in agricultural fields before the mid-1920s, nor along roads and railways before the mid-1930s. The colonization of a large number of agricultural fields by common ragweed probably began with seed-contaminated crops, but was certainly accelerated by the dispersal of seeds from populations growing along nearby roads. Herbarium specimens suggest that common ragweed was present in southern Québec for at least 200 years, but the species was probably restricted to the Montréal area during the 19th century. It is likely that the development of the road network in Québec since the mid-1930s significantly contributed to the spread of common ragweed. Controlling common ragweed solely in agricultural fields would not prevent the re-infestation of crops, because roadsides would act as refuges for the weed.

Seedling emergence and flower phenology of ragweed : climate change indicators? Benoit, D.L. Horticultural Research and Development Centre, Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC.

Global climate changes, driven by increased concentrations of greenhouse gases such as carbon dioxide, are having widespread impacts on biotic systems. One of the most dramatic effects of climate change seen thus far is on the timing of reproductive processes in plants and was generally thought to be beneficial in agriculture through increased yield. This enhanced reproductive effort can also lead to increase in pollen production which, for wind-pollinated allergenic weeds, could result in increased symptoms in human populations with allergic rhinitis or asthma. Common ragweed (*Ambrosia artemisiifolia* L.), a monoecious annual species with separate male and female flowers on the same plant, is well known in agriculture because of its prevalence in most crops in the eastern and central parts of the United States. It is also recognized as the most common cause of allergenic rhinitis or "hay fever". The impact of climate change on this species has been observed on pollen amount, pollen allergergenicity, pollen season, plant and pollen distribution. *A. artemisiifolia* exhibited plasticity for size-dependent (allometric) gender allocation, depending on the environmental cause of variation in plant size (shading or soil nutrient). On the other hand, emergence pattern of this species has been documented to occur within an early but narrow seasonal period with little variation. The problem with predicting the responses of species to future conditions is that most experiments are carried out in manipulated environments thus, being experiments on acclimatory (i.e. the plastic response of individuals) rather than on adaptive (i.e. evolutionary) responses to changes. Our ability to predict and understand the long-term responses to climate change depends upon the improvement of our knowledge of *A. artemisiifolia* adaptation responses via direct means (selection experiments) and indirect means (genotypic variation studies).

Résistance aux herbicides chez l'herbe à poux : impact sur les stratégies de répression. Leroux, G.D. Département de phytologie, Université Laval, Québec, QC.

L'herbe à poux (*Ambrosia artemisiifolia*) est une espèce annuelle nuisible infestant le maïs (*Zea mays*) el le soya (*Glycine max*) cultivés dans l'Est du Canada. Des biotypes d'herbe à poux résistants aux groupes d'herbicides 2 (inhibiteurs d'ALS), 5 (inhibiteurs de PSII au site A) et 7 (inhibiteurs de PSII au site B) sont apparus depuis 1976 en Ontario et à un moindre degré au Québec. À ce jour, il n'y a pas de cas de résistance multiple chez l'herbe à poux au Canada, alors qu'il en existe aux Etats-Unis. Notons de plus que depuis 2004 des cas d'*Ambrosia* résistante au glyphosate (Groupe 9) ont été rapportés aux Etats-Unis. Les stratégies de désherbage de l'herbe à poux doivent : 1) tenir compte des risques d'avènement de résistance chez les populations sensibles et 2) inclure d'autres moyens de lutte quand la résistance est installée dans la population. Parmi les moyens de prévention à privilégier pour retarder l'apparition de la résistance il y a la rotation des cultures , des types de cultures (GM et non GM) et des groupes d'herbicides; l'utilisation de mélanges d'herbicides de groupes différents où chaque herbicide est efficace contre *Ambrosia*; ne pas utiliser le même mode d'action plus d'une fois par saison dans un champ; et utiliser des méthodes de lutte non-chimiques. Il faut inspecter les champs suite au traitement herbicide. Les signes de résistance sont des plantes d'*Ambrosia* en santé parmi d'autres détruites. La tenue de registre des champs où sont consignés les rotations culturales et les traitements herbicides est fortement recommandée. En cas de résistance, il faut recourir au mélange d'herbicides en réservoir ; prévoir un deuxième passage dans le champ avec un herbicide ayant un mode d'action différent ou délaisser la lutte chimique à la faveur de la lutte intégrée.

Common ragweed : An agricultural and urban weed
L'herbe à poux : Un problème agricole et urbain (Posters)

POSTER PRESENTATIONS	
Title	**Authors**
Influence des habitats urbains sur la distribution des populations et de l'émission pollinique de l'herbe à poux à Saint-Jean-sur-Richelieu, Québec	Benoit, D.L., Simard, M.J., Desseaux, C. et Coquart, K
Distribution of common ragweed (*Ambrosia artemisiifolia*) in southern Québec corn and soybean fields and field borders	Simard M.-J. and Benoit, D.L.
Physical control of ragweed in soybean	Leblanc, M.L., Cloutier, D.C., Duval, J. and Weill, A.

Influence des habitats urbains sur la distribution des populations et de l'émission pollinique de l'herbe à poux à Saint-Jean-sur-Richelieu, Québec. Benoit, D.L.[1], Simard, M.J.[2], Desseaux, C.[3] et Coquart, K.[3] Agriculture et agroalimentaire Canada, [1]Saint-Jean-sur-Richelieu, [2]Sainte-Foy, QC, [3]I.U.P. P.V.I.A., Université de Picardie Jules Verne, Amiens, France.

L'herbe à poux (*Ambrosia artemisiifolia* L.) est l'espèce adventice allergène la plus répandue en Amérique du Nord et son pollen est responsable de rhini-conjonctivite. La Table Québécoise sur l'herbe à poux a mis au point un projet pilote afin d'évaluer l'efficacité environnementale et sanitaire d'un programme de contrôle concerté de l'herbe à poux. En 2007 le but était d'évaluer la distribution et la densité de l'herbe à poux et d'estimer la quantité de pollen émis dans les différents habitats urbains à Saint-Jean-sur-Richelieu, ville servant de témoin dans le projet. Les inventaires des populations d'herbe à poux ont été fait en juillet 2007 (densité des populations) et du 9 au 31 août 2007 (émission du pollen). Les relevés ont été stratifié par secteur de ville et habitats urbains afin de caractériser les habitats les plus propices à l'établissement et à la croissance de l'herbe à poux en ville (territoire résidentiel, industriel, aménagé ou perturbé). L'inventaire des populations a été fait par le dénombrement de plantules dans 400 quadrats (25 cm x 25 cm). Le territoire résidentiel présente significativement moins d'herbe à poux que les trois autres types de territoires. Ceci est du à un entretien moins régulier des territoires aménagés, au trafic important dans les territoires industriels et au retournement du sol et au trafic ferroviaire pour les territoires perturbés. L'inventaire pollinique a été fait par 14 capteurs de type Rotorod (12 pour les habitats urbains, deux dans des zone agricoles) installés à 1,5m du sol et un capteur régional installé sur le toit d'un édifice à 15 m de haut. L'émission pollinique est sensiblement la même quelque soit le terrain. La formation d'un pic de pollen a été observée dès la troisième semaine d'août. Ce sont les terrains perturbés qui avaient significativement plus d'émission de pollen.

Distribution of common ragweed (*Ambrosia artemisiifolia*) in southern Québec corn and soybean fields and field borders. Simard M.-J.[1], and Benoit, D.L.[2], [1]Agriculture and Agri-Food Canada (AAFC), Québec, QC; [2]AAFC-St-Jean-sur-Richelieu, QC.

Common ragweed is the most prevalent allergenic weed in North America. It is responsible for most cases of rhinoconjunctivitis ("hay fever"). It can be abundant along roadsides (first 50 cm of vegetation) and in dwellings under construction. In field crops it is mostly prevalent in corn and soybean fields and in field borders. Salaberry-de-Valleyfield (Québec) was chosen as a model area for a mobilization project to control ragweed and monitor the health effects of this control. The Table Québécoise sur l'Herbe à Poux (TQHP) is in charge of the project. An assessment of the distribution and abundance of ragweed in the urban and rural area was necessary to initiate potential control measures in 2008. The rural survey was done by evaluating the density of ragweeds in field borders, field centers and field entries on roads. 43 corn and 21 soybean fields were surveyed in July-August 2007. Ragweeds were more abundant in field entries on roads (93.31 m^{-2} ±6.99(STE)) than in fields or field borders which had similar densities (2.91 m^{-2} ±1.73 and 1.99 m^{-2} ±2.25 respectively). Ragweeds were more abundant in fields under conventional than reduced tillage ($p<0.001$). They were also more abundant in transgenic than conventional corn fields but less abundant in transgenic than conventional soybean ($p<0.001$). Ragweeds found in crops after herbicide application were generally small (pers. observation) and ragweeds found in field borders of low density compared to field entries on roads. The pollen production of these populations growing in different habitats remains to be evaluated.

Physical control of ragweed in soybean. Leblanc, M.L.[1], Cloutier, D.C.[2], Duval, J.[3] and Weill, A.[3] [1] Institut de recherche et de développement en agroenvironnement, Saint-Hyacinthe, QC; [2] Institut de malherbologie, QC; [3] Club agroenvironnemental BioAction, QC, Canada

In the fall, common ragweed (*Ambrosia artemisiifolia* L.) plants look like small shrubs, they can reach a meter in height and stand out in organic soybean fields. Ragweed, which is still green at the time of soybean harvest, hampers the harvest and decreases grain quality by staining the grain. To prevent staining, producers harvest the soybean crop after several frosts which desiccates common ragweed plants. A research project was undertaken in 2005 and 2006 to characterize common ragweed emergence in south-western Quebec, to screen different physical weed control methods and to determine their efficacy against common ragweed in organic soybean fields. Ragweed emerged until July 7 in 2005 and July 29 in 2006 in the treatments with no soil disturbance (weeds were cut at soil surface after each count). Ragweed population reached a cumulative total of 881 and 401 plants m^{-2} in 2005 and 2006, respectively. The physical weed control methods consisted of two series of treatments: one series was conventional mechanical weeding (rotary hoe, flextine harrow and interrow weeding with Danish tines) used in all the treatments except the checks, while the other series consisted of physical weed control measures specifically targeting common ragweed on the crop rows (flaming at various doses alone or combined with ridging, ridging alone or using the Buddingh Finger Weeder). Conventional mechanical weeding decreased ragweed populations to 26 and 107 plants m^{-2} in 2005 and 2006, respectively. Targeted weeding techniques increased ragweed control by an additional 50 to 99%. Of the various techniques assessed, ridging showed the greatest potential to control ragweed. It is an easy, inexpensive technique that can be readily adopted by growers. Soybean yield improved when the targeted weeding techniques were used compared with the conventional mechanical weeding techniques. Yield increased with the number of flaming but the dose had no effect. Combination of flaming and ridging did not improve yield compared with ridging alone. In 2006, the best yield was obtained in the treatments that were ridged.

Thursday November 29th, 2007
Session 2A – Cereals, oilseeds, and pulses

ORAL PRESENTATIONS

Time	Title	Speaker
10:00 – 10:15	Pyroxsulam: a new postemergence herbicide for wheat	Don Hare
10:15 – 10:30	Simplicity* herbicide applied alone and in tankmix combinations for broadleaf weed control in spring and durum wheat in western Canada	Gary Turnbull
10:30 – 10:45	Postemergence grass control with Simplicity* herbicide in spring and durum wheat in Canada.	Bill McGregor
10:45 – 11:00	The relative competition of popular canola hybrids	Neil Harker
11:00 – 11:15	Efficacy of broadleaf weed control with flucarbazone-sodium	Eric Johnson
11:15 – 11:30	Use of flucarbazone–sodium as a preplant and preemergence herbicide in wheat	Brian Schilling
11:30 – 11:45	Impact of pre- and split applications of flucarbazone-sodium on grass weed control and spring wheat (*Triticum aestivum*) yield	Ken Sapsford
11:45 – 12:00	Pyrasulfotole: a new cereal broadleaf herbicide mode of action in Canada	Kelly Patzer
12:00 – 12:15	Infinity™ - a new cereal herbicide for broadleaf weeds in Canada	David Drexler

POSTER PRESENTATIONS

Title	Authors
Interaction of imazamox-bentazon tank-mixes in dry beans (*Phaseolus vulgaris*)	Johnson, E.N., Ulrich, D.J., Downs, M.P., Holm, F.A., Sapsford, K.L., Blackshaw, R.E., Moyer, J.R., Hogg, T.J. and Gan, Y.T.
Weed suppression by canola and mustard cultivars	Beckie, H.J.*, Johnson, E.N., Blackshaw, R.E., and Gan, Y.
Efficacy of pyroxsulam for control of downy brome (*Bromus tectorum* L.) and Japanese brome (*Bromus japonicus*) in winter wheat (*Triticum aestivum*)	Wintonyk B. A., McGregor W. R., Hare D. D., Juras, L. T., Turnbull G. C., Satchivi N.M.
Effect of nitrogen rate and placement and seeding rate on barley productivity and wild oat fecundity in a zero tillage system	O'Donovan, J.T., Clayton, G.W., Grant, C.A., Harker, K.N., Turkington, T.K., and Lupwayi, N.Z.
Responses of winter wheat to preplant and preemergence herbicide tankmixes	Sikkema, P.H., Shropshire, C., and Soltani, N.*
The indisputable value of crop rotations: 18 years of evidence	Légère, A.* and Stevenson, F.C.

Pyroxsulam: a new postemergence herbicide for wheat. Hare, D.D.*, Juras, L.T., McGregor, W.R., Satchivi, N.M., Turnbull, G.C., Wintonyk, B.A. Dow AgroSciences Canada Inc., Calgary, Alberta Canada.

Pyroxsulam is a new triazolopyrimidine sulfonamide herbicide that provides broad spectrum postemergence weed control in wheat. The control spectrum includes key annual grasses occurring in global cereal markets such as Blackgrass (*Alopecurus sp.),* Windgrass *(Apera spica-venti)* Wild Oat *(Avena* sp*.),* Downy Brome *(Bromus sp.),*Ryegrass*(Lolium sp.) and* Canarygrass *(Phalaris sp*.) and certain broadleaf species. Herbicidal activity with pyroxsulam is achieved through ALS inhibition at low use rates ranging from 9 - 18.75 g ai ha^{-1} depending upon timing and target weed species. At these rates it provides some level of residual weed control; however it quickly degrades allowing rotation to most crops the following season. When combined with the safener cloquintocet-mexyl, pyroxsulam is selective in winter and spring wheat varieties (including durum), winter rye and winter triticale over a wide application window. Product concepts will consist of pyroxsulam formulated alone and premixed with other broadleaf herbicides tailored to provide complete one-pass grass and broadleaf weed control weed control and meet needs of local geographies. Overall, pyroxsulam has a very favorable environmental and toxicological profile. It undergoes rapid aerobic microbial soil degradation with an average laboratory soil half-life of 3 days. In studies conducted in western Canada the median field soil half life was 13 days. No degradates of concern were produced in any studies. Pyroxsulam exhibits very low acute and chronic toxicity (practically nontoxic) to mammals, birds, fish and aquatic invertebrates. Studies have shown it not to be carcinogenic, teratogenic, mutagenic, neurotoxic or a reproductive hazard. Pyroxsulam is currently under registration review in the U.S., Canada, Australia and several European Union countries. Dow AgroSciences is seeking to widely register pyroxsulam for use in all major cereal producing countries with first registrations anticipated in late 2007. In Canada, pyroxsulam will be registered with the trade name Simplicity*Herbicide.

Simplicity* herbicide applied alone and in tankmix combinations for broadleaf weed control in spring and durum wheat in western Canada. Turnbull, G.C., Hare, D.D., Juras, L.T., McGregor, W.R., Satchivi, N.M., Wintonyk, B.A., Dow AgroSciences Canada Inc., Calgary, AB.

Simplicity* (pyroxsulam) has post-emergent herbicidal activity on a wide range of broadleaf weed species. Several key broadleaf targets in western Canada are very susceptible while others are moderately susceptible. Field trials have demonstrated that Simplicity controls chickweed *(Stellaria media)*, cleavers *(Galium aparine)*, hempnettle *(Galeopsis tetrahit)*, smartweed *(Polygonum lapathifolium)*, and red root pigweed *(Amaranthus retroflexus)*. An example of a weed that is moderately susceptible is wild buckwheat *(Polygonum convolvulus)*. In most fields a tank mix with a broadleaf herbicide will be required for one pass grass and broadleaf weed control. Field evaluations have shown that Simplicity can be tank mixed with a wide range of broadleaf herbicides. The efficacy and crop tolerance of Simplicity applied in tank mix combinations with bromoxynil, MCPA, 2,4-D, fluroxypyr, florasulam, and clopyralid was tested in spring wheat and durum wheat from 2004 to 2007. The tank mix partners were applied at their recommended field rates.
There is no adverse effect of Simplicity on the dicot weed efficacy of : MCPA, bromoxynil + MCPA, bromoxynil + 2,4-D, bromoxynil + florasulam, MCPA + florasulam, MCPA + clopyralid + florasulam, fluroxypyr + 2,4-D, fluroxypyr + clopyralid + MCPA. Similarly, the addition of tested tank mix partners did not cause any antagonism of the efficacy of Simplicity on wild oat *(Avena fatua),* yellow foxtail *(Pennisetum americanum)* or green foxtail *(Setaria viridis).* Depending on the weed spectrum present, tank mix combinations provide the grower with options to target selected weed species and herbicide resistance management strategies.

Postemergence grass control with Simplicity* herbicide in spring and durum wheat in Canada. McGregor, W.R., Satchivi, N.M.., Juras, L.T., Turnbull, G.C., Hare, D.D., Wintonyk, B., Dow AgroSciences Canada Inc., Calgary, AB.

The grass weed efficacy and crop tolerance of Simplicity herbicide (pyroxsulam) applied alone and in various broadleaf tank mix combinations was tested in spring wheat and durum wheat from 2004 to 2006. More than 90 small-plot field trials were established across various ecozones in western Canada. At late season evaluations, Simplicity applied alone at the proposed label rate of 15 g ai ha^{-1} with COC provided consistent (94.4%) control of wild oats *(Avena fatua)* up to 4-leaf and 2 tillers. The 15 g ai ha^{-1}, rate of Simplicity provided acceptable control of yellow foxtail *(Pennisetum americanum)* up to 4-leaf, and suppression of green foxtail *(Setaria viridis)*. The addition of tested tank mix partners containing MCPA, bromoxynil, florasulam, clopyralid and fluroxypyr did not cause any observable levels of antagonism to the efficacy of Simplicity on wild oat, green and yellow foxtail. Spring wheat varieties including Hard Red Spring (HRS), Canadian Prairie Spring (CPS), Hard White Spring (HWS) and durum wheat up to 6-leaf and 2 tillers exhibited only slight injury symptoms (<5% stunting) 2 weeks after application of Simplicity at 15 g ai ha^{-1}. By the end of the growing season, crop injury was negligible and no significant delay in crop maturity was observed either at heading or at seed maturity. No negative effect on crop yield was observed at harvest. Sensitive dicot crops such as lentils, chickpeas, canola, flax, soybean and peas planted back in wheat fields treated with 15 g ai ha^{-1} and 30 g ai ha^{-1} rates of pyroxsulam 10-11 months after treatment did not show any injury symptoms or yield reduction. Similarly, wheat, barley and tame oats were not affected by soil residues of pyroxsulam up to 30 g ai ha^{-1}.

The relative competition of popular canola hybrids. Harker, K.N.[1], O'Donovan, J.T.[1], Clayton, G.W.[2], Blackshaw, R.E.[2], Brandt, S.[3], Johnson, E.N.[3], Holm, F.A.[4], and Sapsford, K.L.[4] [1]Agriculture and Agri-Food Canada (AAFC), Lacombe, AB; [2]AAFC Lethbridge, AB; [3]AAFC Scott, SK; [4]University of Saskatchewan Crop Development Centre, Saskatoon, SK.

Canola production in Canada is dominated by herbicide-resistant cultivars which control most major weeds and facilitate direct-seeding systems. Hybrid herbicide-resistant cultivars also substantially improve canola competition with weeds. The enhanced competitive ability of the new hybrids has been great enough to warrant comparisons with other crops that are considered to be highly competitive with weeds such as barley and rye. Experiments were conducted in 2006 and 2007 at four to five locations in western Canada each year to compare the relative competitive ability of several open pollinated- and hybrid-spring canola cultivars with spring barley, rye, triticale, and wheat. Cultivated oat was seeded across all experiments to simulate weed competition and oat biomass was used as the primary determinant of the relative competitive ability of each crop cultivar. Results varied considerably from site to site depending on the associated soil zone and environmental conditions. In some cases, hybrid canola cultivars were at least as competitive as barley and more competitive than triticale or wheat. More competitive canola hybrids were often observed at relatively cool, moist sites such as Beaverlodge and Lacombe as opposed to Lethbridge or Scott. At the latter sites, small-grain cereals were often more competitive than any of the canola cultivars. Most of the data indicate that cereal cultivars, and especially barley, are more competitive than canola, but some environments can lead to exceptions. Crop biomass was usually highly negatively correlated with oat (weed) biomass. At all locations, the hybrid canola cultivars were or tended to be more competitive than the open-pollinated cultivars. The relatively high competitive ability of new canola hybrids allows growers to more effectively implement integrated weed management practices with less dependence on herbicides.

Efficacy of broadleaf weed control with flucarbazone-sodium. Johnson, E.N.[1], Sapsford, K.L.[2], Holm, F.A.[2], Schilling, B.S.[3] and May, W.E.[4] [1] Agriculture and Agri-Food Canada (AAFC), Scott, SK: [2]Department of Plant Sciences, University of Saskatchewan, Saskatoon SK; [3] Arysta Life Sciences Corporation, Edmonton, AB. [4]AAFC, Indian Head, SK.

Flucarbazone-sodium is primarily known as a grass herbicide; however, it does control some broadleaf weed species. A number of studies investigating the potential for flucarbazone-sodium to control broadleaf weeds in spring wheat (*Triticum aestivum* L.), flax (*Linum usitstissium* L.), and Clearfield canola (*Brassica napus* L.) have been conducted in Saskatchewan from 2004 to 2007. Preplant, pre-emerge, post-emerge and split applications of flucarbazone were evaluated over a range of rates. Flax tolerance to flucarbazone was inconsistent; therefore, registration was not pursued. Clearfield canola had acceptable tolerance; however, flucarbazone did not offer any advantages over registered products. Although registrations were not generated on these two crops, the weed control data obtained from these studies may be of use for other crops. Enough data was generated for control summaries of wild mustard (*Sinapis arvensis* L.), wild buckwheat (*Polygonum convolvulus* L.), and cow cockle (*Saponaria vaccaria*). Pre-emergence applications of flucarbazone at 30 g ai ha^{-1} provided season long suppression of wild mustard; however, preplant applications did not. Post-emergence applications of >15 g ai ha^{-1} and split pre/post applications of 10/20, 15/15 and 20/10 provided >85% control of wild mustard. Wild buckwheat control was variable at all rates and timings, while the split pre/post applications were the only timings that provided consistent control of cow cockle. The broadleaf weed control ability of flucarbazone may have some potential in minor crops, as preliminary studies indicate that spice crops belonging to the *Umbelliferae* family exhibit sufficient tolerance to this herbicide. These spice crops have few broadleaf weed control options.

Use of flucarbazone–sodium as a preplant and preemergence herbicide in wheat. Schilling, B.S.[1], and Haikal, P.[2] [1]Row Crops, Arysta LifeScience, Edmonton AB; [2]Row Crops, Arysta LifeScience, Denver, CO.

Flucarbazone-sodium (Everest®) is a group 2 herbicide registered on spring wheat for the post-emergent control of wild oat (*Avena fatua*), green foxtail (*Setaria viridis*) and various broadleaf weeds in Canada and the United States. Flucarbazone-sodium's soil activity, tank-mix compatibility, and rate flexibility have allowed for label expansion of flucarbazone-sodium in Canada as a pre-emergent herbicide tank-mixed with glyphosate for burn-off applications. It is proposed flucarbazone-sodium be applied pre-plant, pre-emerge, post-emerge or as a split pre- / post-emerge application to wheat. Pre-applications of flucarbazone-sodium can be made at 10, 15 or 20 gai/ha with the option of applying a split or post-emerge application of 20, 15 or 10 gai/ha, respectively, to a maximum rate of 30 gai/ha per growing season. A post-emergent application of flucarbazone-sodium or broadleaf herbicide may not be required depending upon weed species and densities present in the field. Trials conducted in western Canada and the United States showed split applications provided greater than 90 % wild oat control or control equal to a single, post-emerge application of 20 gai/ha flucarbazone-sodium or graminicides commonly used for wild oat control in wheat. The flucarbazone-sodium pre-emerge application of 20 gai/ha provided approximately 70% wild oat control and approximately 50% of the trials had greater than 80% control. Label expansion of flucarbazone-sodium as a burn-off application with glyphosate provides greater flexibility to the grower as to when flucarbazone-sodium can be applied. Pre-applications provide extended weed control of certain weed species reducing weed competition while protecting yield.

Impact of pre- and split applications of flucarbazone-sodium on grass weed control and spring wheat (*Triticum aestivum*) yield. Sapsford K.L.[1], Holm F.A.[1], Johnson E.N.[2]. [1]Department of Plant Sciences, University of Saskatchewan, Saskatoon Saskatchewan; [2]Agriculture and Agri-Food Canada, Scott, Saskatchewan.

Flucarbazone-sodium, the active ingredient in Everest® herbicide, is known to have soil residual properties when applied post emergent for grass weed control in spring wheat. A number of studies were conducted in Saskatoon and Scott, Saskatchewan in 2005, 2006 and 2007 to see if flucarbazone-sodium applied to the soil prior to crop emergence would control wild oat (*Avena fatua*) and green foxtail (*Setaria viridis*) and to see if a split application of flucarbazone-sodium would effectively control wild oat and green foxtail. Flucarbazone sodium was applied at 10, 15, 20 and 30 gai/ha pre-emergent to wheat and wild oats and pre/post applications of 10/10, 10/15, 10/20, 15/10, 15/15 and 20/10 gai/ha were also evaluated. These were compared to post emergent applications of 15, 20 and 30 gai/ha. Wild oat control averaged over 90% with all the split and post-emergent applications. With the pre-emergent applications wild oat control averaged below 80%. However, with pre-emergent application rates of 15, 20 and 30 gai/ha, wild oat control of over 80% was achieved 50%, 33% and 70% of the time respectively. It appears that pre-emergent application of flucabazone-sodium can provide adequate wild oat control approximately 50% of the time, eliminating the need for the post-emergent portion of the split application in these instances. Green foxtail was control averaged over 90% with every treatment that was applied.

Pyrasulfotole: a new cereal broadleaf herbicide mode of action in Canada. Patzer, K.T.A.[1], Richardson, D.J.[2], Gibb, B.R.[3] [1] Department of Research & Development, Bayer CropScience Canada, Calgary, AB, [2] Department of Knowledge Management, Bayer CropScience Canada, Calgary, AB, [3] Department of Research & Development, Bayer CropScience Canada, Winnipeg, MB

Pyrasulfotole is the first commercial cereal broadleaf herbicide with a new mode of action to be registered in Canada in over 20 years. Pyrasulfotole inhibits the p-hydroxyphenylpyruvate dioxygenase (HPPD) enzyme in susceptible plants, thereby blocking carotenoid biosynthesis and producing characteristic bleaching symptoms in new growth of sensitive species. Pyrasulfotole exhibits wide spectrum broadleaf weed control including herbicide resistant weed species. When combined with the safener mefenpyr-diethyl, pyrasulfotole is highly selective in spring and durum wheat, winter wheat, barley, triticale and timothy over a wide application window. Pyrasulfotole has a very favorable environmental and toxicological profile. It undergoes rapid microbial degradation in the soil, with a demonstrated half life of 6 – 18 days under field conditions. The rapid soil dissipation characteristics allow rotation to a wide range of crops the year after application. Pyrasulfotole and Infinity herbicide received registration in Canada on September 27, 2007.

Infinity™ - a new cereal herbicide for broadleaf weeds in Canada. Richardson, D.J.[1]., Patzer, K.T.A.[2], Drexler, D.M.[2], and Gibb, B.R.[3]. [1]Department of Knowledge Management, Bayer CropScience, Calgary, AB; [2]Department of R&D, Bayer CropScience, Calgary, AB; [3]Department of R&D, Bayer CropScience, Winnipeg, MB.

Infinity™ is the first product in Canada registered with the new and novel mode of action active ingredient pyrasulfotole. Included in the formulation along with pyrasulfotole (37.5 g L^{-1}) will be both bromoxynil (210 g L^{-1}) and the Bayer CropScience proprietary cereal herbicide safener mefenpyr diethyl. Recently registered on wheat (spring, durum and winter), barley, triticale and timothy (seed production), Infinity can be applied from the 1st leaf stage up until the flag leaf becomes visible. The spectrum of weeds on the

Infinity label is wide, and includes all important broadleaved weeds in Western Canada. It can be applied by ground or air. Infinity may be mixed with Puma Super® (fenoxaprop-p-ethyl) in wheat and barley, or Horizon® (clodinafop-methyl) in wheat for comprehensive control of broadleaved and grassy weeds. The list of crops which can be sown the year after application of Infinity is also wide-ranging and should present no major limitation in Western Canada. The interaction of bromoxynil and pyrasulfotole is very positive in terms of spectrum and speed of activity.

Interaction of imazamox-bentazon tank-mixes in dry beans (*Phaseolus vulgaris*). Johnson, E.N.[1], Ulrich, D.J.[1], Downs, M.P.[2], Holm, F.A.[3], Sapsford, K.L.[3], Blackshaw, R.E.[4], Moyer, J.R.[4], Hogg, T.J.[5] and Gan, Y.T.[6] [1]Agriculture and Agri-Food Canada (AAFC), Research Farm, Scott, SK; [2]AAFC, Pest Management Centre, Ottawa, ON;, [3]University of Saskatchewan, Saskatoon, SK; [4]AAFC, Research Centre, Lethbridge, AB; [5]Canada-Saskatchewan Irrigation Diversification Centre, Outlook, SK; [6]AAFC, Semiarid Prairie Agricultural Research Centre, Swift Current, SK.

An imazamox / bentazon tank-mix has the potential to provide broad spectrum weed control in dry bean (*Phaseolus vulgaris*). The tank-mix is registered in Eastern Canada; however, data is limited for the Prairie Provinces. The Pesticide Minor Use program conducted six field trials in Alberta and Saskatchewan in 2006 to provide data for a minor use registration. Imazamox + bentazon were applied at respective rates ranging from 20 gm ae/ha + 600 gm ae/ha to 40 gm ae/ha + 1200 g ae/ha on navy, great northern and cranberry bean classes. Additional treatments included 2 L/ha of liquid nitrogen (28-0-0) added to the low rate mix and 4L/ha added to the high rate mix. Navy beans were more sensitive to imazamox than the other market classes. The addition of bentazon to imazamox reduced injury and injury remained acceptable when liquid nitrogen was added to the mix. Antagonism between imazamox and bentazon reduced grassy and cleaver weed control to below acceptable levels at the 1X rate which was overcome with the addition of liquid N to the tank mix. Imazamox + Merge at the 1X rate resulted in significantly higher bean yields than the weedy check. The addition of bentazon further increased yields only when liquid N was added. The level of increase was a function of bean market class with the less competitive navy beans exhibiting a greater yield response than the more competitive cranberry and great northern classes.

Weed suppression by canola and mustard cultivars. Beckie, H.J.[1], Johnson, E.N.[2], Blackshaw, R.E.[3], and Gan, Y.[4] [1]Agriculture and Agri-Food Canada (AAFC), Saskatoon, SK; [2]AAFC, Scott, SK; [3]AAFC, Lethbridge, AB; [4]AAFC, Swift Current, SK

Competitive crops or cultivars can be an important component of integrated weed management systems. A study was conducted from 2003 to 2006 at four sites across semiarid prairie ecoregions in western Canada to investigate the weed-suppression ability of canola (*Brassica napus* L.) and mustard (oriental mustard or canola-quality mustard, *Brassica juncea* L. Czern. & Coss; yellow mustard, *Sinapis alba* L.) cultivars. Four open-pollinated canola cultivars, four hybrid canola cultivars, two canola-quality mustard cultivars, two oriental mustard cultivars, and two yellow mustard cultivars were grown in competition with indigenous weed communities. Yellow mustard was best able to suppress weed growth, followed in decreasing order of weed competitiveness by oriental mustard, hybrid canola, open-pollinated canola, and canola-quality mustard. Weed-competitive ability of cultivars, assessed by total weed biomass, was correlated with time to crop emergence, early-season crop biomass accumulation (prior to bolting), and plant height.

Efficacy of pyroxsulam for control of downy brome (*Bromus tectorum* L.) and Japanese brome (*Bromus japonicus*) in winter wheat (*Triticum aestivum*). Wintonyk B. A., McGregor W. R., Hare D. D., Juras, L. T., Turnbull G. C., Satchivi N.M. Dow AgroSciences Canada Inc., Calgary, Alberta, Canada

Downy brome and Japanese brome have become more prevalent and increasing weed concerns in winter wheat through the southern prairie winter wheat growing regions of western Canada. The similar life cycle and timing of emergence of these weeds creates a very competitive environment with winter wheat. Downy and Japanese Brome are currently managed through cultural practices and the use of glyphosate prior to seeding or crop emergence. With the expansion of winter wheat acres growers' are finding control of downy and Japanese brome to be an increasing weed problem with few herbicide options available within current cropping programs. Pyroxsulam is a new group 2, non-residual cross spectrum grass and broadleaf herbicide being developed by Dow AgroSciences. Field research has been conducted to determine the efficacy of pyroxsulam for control of downy and Japanese brome in winter wheat and to understand the level of winter wheat tolerance. Pyroxsulam winter wheat trials consisted of both fall and spring applications to winter wheat between 2005-2007. Studies consisted of three different pyroxsulam rates compared to a standard treatment and an untreated. The results indicate that pyroxsulam demonstrated excellent winter wheat tolerance and control of downy brome and Japanese brome. Further studies will be conducted to confirm optimum use rates and application timing.

Effect of nitrogen rate and placement and seeding rate on barley productivity and wild oat fecundity in a zero tillage system. O'Donovan, J.T.[1], Clayton, G.W.[2], Grant, C.A.[3], Harker, K.N.[1], Turkington, T.K.[1], and Lupwayi, N.Z.[4]. [1]Agriculture and Agri-Food Canada (AAFC), Lacombe Research Centre, Lacombe, AB; [2]AAFC, Lethbridge Research Centre, Lethbridge, AB; [3]AAFC, Brandon Research Centre, Brandon, MB; [4]AAFC, Beaverlodge Research Farm,, Beaverlodge, AB.

Seed-placed nitrogen (N) in the form of urea can be a popular option for barley (*Hordeum vulgare* L.) producers in western Canada since it allows seeding and fertilizer application to be accomplished simultaneously with minimal soil disturbance. However, seedling damage can occur from excess seed-placed urea. The objective of this study was to compare the effects of seed-placed and side-banded N (urea) applied at different rates, and to investigate if increasing the barley seeding rate would improve the ability of barley to overcome urea induced injury and compete better with wild oat (*Avena fatua* L). A field experiment was conducted at three locations in western Canada over three years. N was applied as urea at five rates (0, 30, 60, 90 and 120 kg ha^{-1} actual N) either directly with the seed or as a side-band, at three barley seeding rates (200, 300 and 400 seeds m^{-2}). When N was placed with the seed, barley plant density decreased, while time to maturity and wild oat fecundity increased as N rate increased. Barley yield also decreased but only at N rates above 60 kg ha^{-1}. Increasing the seeding rate partially overcame the negative effects of seed-row N placement. However, barley densities and yields were still lower, and wild oat fecundity greater compared to when N was applied as a side-band. Placing N as a side-band did not reduce barley density, resulting in shortened time to maturity, increased barley yield, and lower wild oat fecundity as compared to seed-placed N.

Responses of winter wheat to preplant and preemergence herbicide tankmixes. Sikkema, P.H., Shropshire, C., and Soltani*, N. Department of Plant Agriculture, University of Guelph Ridgetown Campus, Ridgetown, ON.

Field experiments were established at the Huron Research Station and at University of Guelph Ridgetown Campus in the fall of 2004 and 2005 to evaluate the tolerance of winter wheat to tankmixes of glyphosate plus either amitrole, dicamba, dicamba/diflufenzopyr, 2,4-D amine, 2,4-D ester, chlorimuron-ethyl or thifensulfuron- methyl/tribenuron-methyl applied preplant (PP) and preemergence (PRE). Contrasts comparing PP vs PRE treatments showed no difference in visible injury, plant height and yield between application timings. The tankmix of glyphosate (1800 g/ha) plus either amitrole (1155 g/ha), dicamba (300 g/ha), 2,4-D amine (700 g/ha), 2,4-D ester (700 g/ha) or thifensulfuron-methyl/tribenuron-methyl (15 g/ha) caused minimal (less than 5%) and transient visible injury in winter wheat (Table 1). In addition, these tankmixes had no effect on plant height and yield. The tankmix of glyphosate (1800 g/ha) with dicamba/diflufenzopyr (200 g/ha) or chlorimuron-ethyl (9 g/ha) caused as much as 8 and 18% visible injury in winter wheat, respectively (Table 1). Glyphosate (1800 g/ha) plus dicamba/diflufenzopyr (200 g/ha) did not affect plant height but glyphosate plus chlorimuron-ethyl reduced plant height 11%. Yield was reduced 15% when glyphosate was tankmixed with dicamba/diflufenzopyr and 26% when glyphosate was tankmixed with chlorimuron-ethyl. Based on these results, the PP and PRE application of glyphosate tankmixes with dicamba/diflufenzopyr or chlorimuron-ethyl resulted in unacceptable injury in winter wheat at the rates evaluated. The PP and PRE application of glyphosate tankmixes with amitrole, dicamba, 2,4-D amine, 2,4-D ester and thifensulfuron- methyl/tribenuron-methyl at the rates evaluated had an adequate margin of crop safety for weed management in winter wheat under Ontario growing conditions.

The indisputable value of crop rotations: 18 years of evidence. Légère, A.[1] and Stevenson, F.C.[2] [1]Agriculture and Agri-Food Canada, Saskatoon, SK; [2]Research Consultant, Saskatoon, SK

Benefits of crop rotations have been extensively documented to the point that it is surprising that monocultures are still being practiced. Rotation benefits can be attributed to varied crop/weed management practices. Certain crop rotations may result in improved weed control or allow crops to tolerate greater weed pressure without compromising yields. Weeds may be more abundant in some rotations, depending on the crop sequence and associated weed management practices. It is unclear whether rotation benefits in terms of improved weed management or crop yields hold true across contrasted tillage systems, from full inversion tillage to no-tillage. Our objective is to show that crop rotation can sustain optimum crop yields under various tillage systems, even if/when weeds are more abundant. A conservation tillage study initiated in 1987 first included a cereal-forage rotation phase, followed by a cereal-oilseed rotation phase. We used test crops at the end of each crop rotation phase (1995, 2005) to assess overall rotation effects. During each phase of the experiment, yields for the rotation were consistently greater or similar than those for the monoculture, regardless of the crop sequence or tillage practice, and even where weeds were more abundant than in monoculture. The wheat test crop (1995) following the cereal-forage rotation and the corn test crop (2005) following the cereal-oilseed rotation generally had less weed biomass and produced greater yields in the former rotation plots than in former monoculture plots across all three tillage systems. These crop rotations benefits were observed across perennial and annual crop sequences and contrasted tillage systems. Sound policy would be needed to buffer against short term market pressures and allow farmers to stick to planned sustainable rotations.

Thursday November 29th, 2007
Session 2B – Invasive and noxious weeds

ORAL PRESENTATIONS		
Time	**Title**	**Speaker**
10:00 – 10:15	Long-term strategies against invasive weeds: case study from Langley, BC	David Clements
10:15 – 10:30	Weeds cross borders project: A joint British Columbia/Washington state invasive plant weed management program	David E. Ralph
10:30 – 10:45	Invasive weed management with Aminopyralid in rangeland, pastures, IVM and non-cropland vegetation management in Canada	Don Hare

Long-term strategies against invasive weeds: case study from Langley, BC. Clements, D.R. Biology and Environmental Studies, Trinity Western University, Langley, BC

By nature invasive plant species require a management strategy that is both effective in the short term attempts to prevent sexual or vegetative reproduction and further invasion in the long-term. Local areas must be resourced to carry out labour intensive weed control. In 2005, an Invasive Plant Strategy for British Columbia was adopted and the Invasive Plant Council of BC was formed. On-the-ground work via regional invasive plant committees has yielded successes in many areas, and yet there is also a need to manage invasive plants more locally. Municipalities can be very effective at marshalling resources to deal with invasive plants. To my knowledge, Langley, BC is the first municipality in Canada to develop and adopt a 10 year strategy for invasive plants. The strategy was adopted by Langley Township Council (ToL) in May 2007 after being formulated by a non-governmental organization, the Langley Environmental Partners Society (LEPS). The strategy involves six priority species: giant hogweed (Sommier & Levier), Japanese knotweed [*Fallopia japonica* (Houtt.) Ronse Decr.], Himalayan balsam (*Impatiens glandulifera* Royle), English ivy (*Hedera helix* L.), purple loosestrife (*Lythrum salicaria* L.) and tansy ragwort (*Senecio jacobaea* L.). As well as prioritizing species, the plan prioritizes ten ToL parks. Specific control activities are planned for specific species over the ten years. For example, a watershed level approach is designed for reducing populations of Himalayan balsam which produces seeds that spread downstream via hydrochory. The plan also encompasses public education and ways of enlisting volunteers and targets additional weed species for education. Finally, it attempts to capture the realism associated with invasive species management, stating that "this does not mean that after ten years of stringent adherence to this plan the invasive species issues will be alleviated"; rather that this is Phase One in an ongoing effort.

Weeds cross borders project: a joint British Columbia/Washington state invasive plant weed management program. Ralph, D.[1], Stewart, B.[2], Scott, L.[3], Lyons, A.[4] [1]BC Ministry of Agriculture and Lands, Kamloops, BC.; [2]Boundary Weed Management Committee, Rock Creek, BC.; [3]South Okanagan Invasive Plant Society, Summerland, BC.; [4]Okanogan County Noxious Weed Control Board, Washington, USA

In 2004, Okanogan and Ferry Counties in Washington State, and the Boundary Weed Management Committee and the South Okanagan Invasive Plant Society in BC, officially developed the Weeds Cross Borders Project to address the pathways of invasive plant species movement across the Canada-US border. A joint committee of county and regional committee representatives developed a strategy to identify priority invasive plant species, create a species inventory, identify critical management areas and develop an education and awareness plan in all participant jurisdictions. Canadian and U.S. federal, state and county governments and non government agencies signed Memorandums of Understanding to establish support for the project and to identify funding, roles and responsibilities of each partner group. Over 4 years, four one day cross border field tours have been held where federal, regional and local politicians are invited to view and discuss the extension, inventory and management activities identified in the projects' strategic plan. The project has: successfully stopped leafy spurge (*Euphorbia esula* L.) spread along the Kettle River system; established four new biological control insects on 4 priority weed species; manually controls nodding thistle (*Carduus nutans* L.) 30 m either side of the border between jurisdictions annually; and chemically controls 4 other priority species within border proximity and along corridors. Commitment from most partners is committed for 2008/2009.

Invasive weed management with Aminopyralid in rangeland, pastures, IVM and non-cropland vegetation management in Canada. Hare, D.D.*, McFadden, A.G.G., McGregor, W.R., Juras, L.T., Satchivi, N.M., Turnbull, G.C., Wintonyk, B.A. Dow AgroSciences Canada Inc, Calgary, Alberta, Canada

Aminopyralid is a new systemic active ingredient developed by Dow AgroSciences specifically for use for control of invasive weeds in rangeland and pasture systems, for Industrial Vegetation Management (IVM), and for non-crop land management in Canada. Aminopyralid is a pyridine carboxylic acid herbicide which has post emergence activity on a variety of established noxious broadleaf invasive and undesirable plants, and provides residual seedling control of a number of key broadleaf weeds species. Aminopyralid is effective at rates between 60 and 120 g ae/ha, which can be as little as 5% of the use rate of currently registered rangeland and pasture and IVM herbicides including, clopyralid, 2,4-D, dicamba, picloram, and triclopyr. Aminopyralid controls over 40 species of broadleaf weeds the year of and after treatment, which extends the value of aminopyralid in vegetation management programs. Species controlled by aminopyralid include: Sages, (*Artemisia sp.)*, Musk Thistle (*Carduus sp.)*, Knapweeds (*Centaurea sp.),* Ox-eye Daisy *(Chrysanthemum sp)*, Canada Thistle (*Cirsium sp.)*, Scentless Chamomile (*Matricaria sp.),* Tall Buttercup (*Ranunculus sp.),* Dock *(Rumex sp.)* and Sow Thistle *(Sonchus sp.).* Aminopyralid can also applied in combination with 2,4-D amine at rates of 720 to 1440 g ae/ha to further complement the spectrum of broadleaf species controlled including Wild Carrot (*Daucus sp.)*, W. Snowberry (*Symphoricarpos sp.),* Common Tansy *(Tanacetum sp.)* and Dandelion *(Taraxacum sp.),* among others. Over 20 species of both warm- and cool-season rangeland and pasture grasses are tolerant to aminopyralid applied at label rates. Research continues to determine the efficacy of aminopyralid on other invasive undesirable weeds, on the role of aminopyralid in facilitating desirable plant establishment, rangeland and pasture renovation, and protection of sensitive habitant. Aminopyralid is sold as RESTORE* Herbicide in Canada for Range and Pasture uses, and MILESTONE* Herbicide in IVM and non-crop vegetation management uses.

Thursday November 29th, 2007
Session 2C – Forage, rangeland, forestry, and industrial vegetative management

ORAL PRESENTATIONS		
Time	**Title**	**Speaker**
11:00 – 11:15	Flumioxazin: A new preemergence tool for broadleaf weed control in industrial vegetation management	Beth Connor
11:15 – 11:30	Dog-strangling vine impacts on forestry and recreational lands in Ontario	Nancy Cain
11:30 – 11:45	Wet Blade, a new innovation for industrial vegetation	Keith Boras
11:45 – 12:00	Is plant species diversity in conifer plantations affected by mechanical release treatments?	Nelson Thiffault

POSTER PRESENTATIONS	
Title	**Authors**
The tolerance of foxtail millet (*Setaria italica* (L.) P. Beauv.) to combinations of fluroxypyr, clopyralid, and MCPA	May, W.E., Johnson,E.N., Ulrich, D.J., and Lafond, G.P.

Flumioxazin: A new preemergence tool for broadleaf weed control in industrial vegetation management. Connor B., Engage Agro Corporation, Guelph, Ontario.

Flumioxazin is a new Group 14 herbicidal active ingredient that provides residual control of susceptible weeds in bare ground non-crop areas, including industrial sites. Once activated by water, flumioxazin provides preemergence control of selected grass and broadleaf weeds by inhibiting protoporphyrinogen oxidase, an essential enzyme required by plants for chlorophyll biosynthesis. Seedling weeds are controlled when exposed to sunlight following contact with the soil applied herbicide. Flumioxazin was applied at 1 to 2 applications per season at a rate of 285.6-428.4 g ai ha^{-1}; applications were made to bare ground non-crop areas as a broadcast spray. Postemergence applications tested flumioxazin in a tank mix with glyphosate. Results showed that flumioxazin provided excellent residual control of kochia, pigweed, ragweed, and common lamb's-quarters. The tank mix of flumioxazin + glyphosate provided excellent postemergence burndown and residual preemergence control of weeds.

Dog-strangling vine impacts on forestry and recreational lands in Ontario. Cain N.P.[1] and Puttock G.D.[2] [1]Cain Vegetation Inc., Acton, ON; [2]Silv-Econ Ltd., Newmarket, ON.

Dog-strangling vine (or swallow-wort) species are invasive, herbaceous, vine species that create major problems for land managers in south central and south-eastern Ontario. Two species, dog-strangling vine (*Cynanchum rossicum* (Kleopow) Borhidi), and black dog-strangling vine (*Cynanchum louiseae* Kartesz and Gandhi), are invasive weeds in Ontario; the former has creamy pink to reddish-brown flowers while the latter has dark purple to almost black flowers. Dog-strangling vines are members of the milkweed family and propagate by wind-blow seeds and short rhizomes. They typically infest old fields and meadow areas; and thick infestations almost completely replace the existing native plant communities and desirable plants by out-competing herbs and smothering shrubs and saplings with viney growth.

In some counties, dog-strangling vine is prevalent on roadsides and occurs in varying degrees on many forest sites. It has been found in forest edges or within mature forest stands and forest plantations, specifically open forest canopies such as red pine plantations. In many sites, vine cover almost completely replaces under-storey vegetation. The impacts of dog-strangling vine under-storey on forest production include preventing natural regeneration and killing any established seedlings. Heavy stands of this weed severely limit access for tree marking and access to recreational sites. In field sites, heavy infestations interfere with new plantation establishment without preplant control.

Control options must be economically feasible and take into account the desirable species on site, whether forest, recreational or protected habitats. Herbicide programs required to control established stands of dog-strangling vine are costly and require specialized manpower not typically used in forest production. As well, the herbicides could reduce natural regeneration and not be tolerated by planted or naturally-regenerated stock. Although herbicide use and cultural management have a role in dog-strangling vine management, the development and registration of biological controls are desirable to limit the spread of these weeds.

Wet Blade, a new innovation for industrial vegetation. Boras, K.M. Lacombe County, Lacombe AB.

The use of mechanical vegetation control followed by herbicide applications has been utilized in industrial vegetation management with varying results. Wet Blade technology has evolved into a system that is mechanically reliable and demonstrates the ability to control a variety of weedy and brush species with some significant benefits to the environment. This system involves the placement of herbicide to the underside of a mower blade and relies on either wiping the control agent on the target species cut surface, in the case of brush species, or the application in the form of fine droplets to weedy species. The application placement is adjusted by using cutting blades that are either high lift or suction to treat weedy species or non lift blades that wipe the control agent on the cut surface of the plant. Lacombe County has been working to evaluate the effectiveness of this technology in an industrial vegetation management situation for the past three years. On brush species the control achieved has been improved over conventional spraying methods. On weedy species the control is similar to conventional spraying technology, but achieved with some significant environmental and cost benefits. The application of the control agent under the controlled environment of the mower deck eliminates much of the drift potential associated with conventional spraying. By combining the physical control with herbicide application into a one pass system we are realizing some significant cost benefits as well as public acceptance.

Is plant species diversity in conifer plantations affected by mechanical release treatments? Thiffault, N., and Roy, V. Direction de la recherche forestière, Ministère des Ressources naturelles et de la Faune du Québec, Québec, QC.

In Québec, the use of chemical herbicides is prohibited on forest crown lands since 2001. In this context, achieving free-to-grow conifer plantations requires an integrated vegetation management strategy to minimize the need for repeated mechanical release treatments on high-competition sites. The Québec strategy is based on the use of large seedling stock outplanted the spring immediately following a final harvest, in order to take advantage of favorable growth conditions, which prevail before competing vegetation establishment. To optimize mechanical release effects within this strategy, a network of 14 experimental sites, that cover a range of ecological conditions, was established. Our main objective was to determine the optimal delay (number of years since planting) before performing a mechanical release which could maximize conifer seedling growth and minimize the need for a second treatment. We also aim at quantifying the impacts of mechanical release on the vegetation community, in terms of richness and diversity. Each experimental site consists of a completely randomized block design with 5 to 8 replicates. Preliminary results for a sub-set of the entire experimental network confirm the importance of release treatments for seedling growth over a range of ecological conditions. However, carrying mechanical release 3 (R3), 4 (R4) or 5 (R5) years after planting large seedlings did not affect seedling size reached at age 8 years, over the range of conditions tested. Similarly, we did not observe major differences in the vegetation diversity ; shannon's index of diversity and species evenness were equivalent among the treatments, including the control. However, results from canonical discriminant analyses suggest significant differences between R3 and R5 vegetation communities on some sites. Further investigations, integrating change over time up to 12 years following planting, as well as a larger array of ecological conditions, will be performed.

The tolerance of foxtail millet (*Setaria italica* (L.) P. Beauv.) to combinations of fluroxypyr, clopyralid, and MCPA. May, W.E.[1], Johnson,E.N.[2], Ulrich, D.J.[2], and Lafond, G.P.**nations of fluroxypyr, clopyralid, and MCPA.** May, W.E.[1], Johnson,E.N.[2], Ulrich, D.J.[2], and Lafond, G.P.[1]
[1]Agriculture and Agri-Food Canada(AAFC), Indian Head Research Farm, Indian Head, SK; [2] AAFC, Scott Research Farm, Scott, SK

Foxtail millet (*Setaria italica* (L.) P. Beauv., golden German millet, Italian millet) is currently being used in swath grazing to extend the grazing season and reduce the cost of feeding cattle in the winter. For this practice to be successful inexpensive weed control measures are needed. The objective was to test the tolerance of foxtail millet to commercially available combinations of bromoxynil clopyralid, fluroxypyr, and MCPA. The following treatments were used, weed free, 280 g ai/ha MCPA + 280 g ai/ha bromoxynil, 560 g ai/ha MCPA + 560 g ai/ha bromoxynil, 560 g ai/ha MCPA + 100 g ai/ha clopyralid, 1120 g ai/ha MCPA + 200 g ai/ha clopyralid, 562 g ai/ha MCPA + 108 g ai/ha fluroxypyr, 1124 g ai/ha MCPA + 216 g ai/ha fluroxypyr, 560 g ai/ha MCPA + 100 g ai/ha clopyralid + 144 g ai/ha fluroxypyr, and 1120 g ai/ha MCPA + 200 g ai/ha clopyralid + 288 g ai/ha fluroxypyr. This study was carried out at Indian Head, SK in 2004, 2005, 2006 and 2007 and Scott, SK in 2006 and 2007. The experimental design was a randomized complete block design with 4 replicates. Crop injury and Crop dry matter were the measured variables. The statistical analysis was conducted using the Proc Mixed procedure of SAS. Herbicide treatments were considered fixed, site years were considered random. The results of the study indicate that no treatment exceeded 20% crop injury when averaged over all the site-years. There were three treatments that had a higher crop injury rating than the weed free check at 7 to 14 days after the herbicide application. These differences had completely disappear by 42 to 56 days after application. There were no difference among treatments for crop dry matter. In conclusion, all four herbicide combinations were save to use on foxtail millet when grown in Saskatchewan and other areas with similar environmental conditions during the growing season.

Committee Reports

Nominations Committee Report
Submitted by Anne Légère, November 12, 2007

Anne Légère, Chair
Marie-Josée Simard
Bruce Murray

The position of Treasurer was held by Mike Cowbrough (Ontario Ministry of Agriculture and Food, Crop Science Building, University of Guelph, Guelph, ON) and Mike was re-elected by acclamation. Mike's term is from 2007 to 2010.

The position of Research Reports Director was held by Eric Johnson, Agriculture and Agri-Food Canada, Scott, SK, and Eric has agreed to continue in the role for an additional three years (2005-2008).

The position of Provincial Extension Representative, previously held by Danielle Bernier, has been filled by acclamation by Clark Brenzil, Saskatchewan Agriculture, Regina.

The position of 2nd Vice President went to ballot. Candidates nominated were:

- Susan Boyetchko, AAFC, Saskatoon, SK
- Mahesh Upadhyaya, University of British Columbia, BC

The position of Member at Large (West) went to ballot. Candidates nominated were:
- David Drexler, Bayer CropScience Inc., Calgary, AB
- Robert Gulden, University of Manitoba, Winnipeg, MB

Approximately 35% of the eligible membership voted. The result was:

2nd Vice-President elected (becomes 1st Vice-President in 2008 and President in 2009)
- Susan Boyetchko

Member at Large (West) (a three year term, 2007 - 2010)
- Robert Gulden

Many thanks to Bruce Murray for his three years of service as Member at Large (West); and to Mike, Susan, Mahesh, David and Robert for allowing their names stand for the vacant positions.

The 2008 meeting will be held in Banff, Alberta.

Anne Légère
Chair, Nominations Committee

Report of the Scholarships & Awards Committee to the CWSS-SCM Board of Directors, November, 2007.

Submitted by

F.A. Holm, PAg.
Chair, 2007

1. Student Awards:
Thirteen very high quality applications were received from across Canada and this bodes well for the future of weed science assuming of course, that there will be weed science related jobs for these people when they complete their graduate programs. The winners are listed in the table below.

Award	Recipient / University	Supervisor
Monsanto Scholarship (PhD)	Chris Willenborg / Manitoba	Dr. Rene. Van Acker
Monsanto Scholarship (MSc)	Amélie Bilodeau / Laval	Dr. Gilles Leroux
Dow Travel Award (PhD)	Eric Page / Guelph	Dr. Clarence Swanton
Dow Travel Award (MSc)	Kristina Polziehn / Alberta	Drs. L. Hall & N. Harker
Syngenta Travel Award (PhD)	Amit Jhala / Alberta	Dr. Linda. Hall
Syngenta Travel Award (MSc)	Heather Flood / Manitoba	Dr. Martin Entz
Bayer Best Student Presentation	Chris Willenborg / Manitoba	Dr. Rene. Van Acker

For the second time (in memory, at least) there was a repeat winner of the Monsanto Scholarship at the PhD level. Since there was no written policy dealing with this situation, the Committee agreed that the repeat award should be made. However, it raised the question of whether or not this should be allowed in future.

The S&A Committee recommends that an individual be eligible to receive the Monsanto Scholarship only once at the MSc level and once at the PhD level.

The Committee has a concern about the fairness when unilingual members of the Committee are faced with evaluating student award applications and in a language they are not fluent in.

To overcome this concern and ensure fairness to all applicants the Committee recommends that when requested, the BOD cover the cost of translation of the student award applications. It is suggested that this should be arranged by (or done by) the Executive Assistant and considered an additional duty over and above the existing service contract.

It is recognized that this may require a further adjustment to application and nomination deadlines.

The Committee wishes to draw attention to the fact that some student applicants do not describe their extra-curricular activities in their application even though this is one of the selection criteria. Therefore, we will ask the Executive assistant to post the evaluation scoresheet on the Awards portion of the website so that students are reminded of the importance of including this information in their applications.

2. CWSS-SCM Awards:
The Committee was pleased to deal with nominations for the Excellence in Weed Science Award (1) and the new Fellowship award (4). The recipients are listed in the table below. We were disappointed that

there were no nominations for the Outstanding Industry Award and for the new Meritorious Service award.

Award	Recipient	Employer
Excellence in Weed Science	Dr. Suzanne Warwick	AAFC, Ottawa
Fellow	Dr. Jerry. A. Ivany	AAFC, Charlottetown
Fellow	Dr. Susan E. Weaver	AAFC, Harrow
Fellow	Dr. Allan S. Hammil	AAFC, Harrow
Fellow	Dr. Paul B. Cavers	U of Western Ontario, London
Meritorious Service	Nil	
Outstanding Industry Member	Nil	
Best Poster	Julia Y. Leeson & A. Gordon Thomas	AAFC, Saskatoon

Application and Nomination Deadlines:
The current deadline of October 1 is very tight in terms of reviewing applications and nominations, notifying winners and making arrangements for student participation in the program and for the awards ceremony.

The Committee discussed this situation and recommends that the application deadline for Scholarships and Travel Awards be moved to September 15 of each year.

The Committee experienced a small problem with respect to late nominations fro CWSS-SCM awards (one nearly a month late**).**

The Committee recommends that greater effort be made (by the Committee, the BOD and by members) to have nominations submitted in a timely fashion. The Committee will promote submission of nominations by the end of April.

Securing Nominations for CWSS-SCM Awards:
This is an on-going concern. There are many members of the Society who would be very strong nominees for the various awards but the first step in the recognition process is for the Committee to receive a nomination. Ideally, the membership at large would provide a good supply of nominees for the Committee to consider but this has not been the case to date. The Outstanding Industry Member award is a particular concern. It has been suggested that the S & A Committee should solicit nominations but this raises the concern that those soliciting the nomination of an individual would then also be passing judgment on the nomination. To operate at arms length, all nominations should originate from the membership.

The Committee discussed this issue and recommends that it not be directly involved in the nomination process.

It further recommends that the Industry members on the BOD be responsible arranging for and/or submitting nominations for the Outstanding Industry Member award.

Nomination Format:
The Committee recommends that reference to Place and Date of Birth be deleted from the requirements on the nomination form as this information is not relevant to the criteria for the award.

Fellowships:
The Committee recommends that, in addition to the Certificate of Fellowship, each Fellow receive a "CWSS-SCM Fellow" lapel pin and that a "Fellow" ribbon be affixed to the name tag of Fellows who register for the CWSS-SCM annual conference.

3. Recognition of Retirees:
Recognition of retirees who do not receive a CWSS-SCM award in the last year of their careers has been a part of our annual meeting for some time. However, the process of identifying such people and arranging for suitable recognition has been an ad hoc affair, usually left to the Local Arrangements Committee and usually done at the last minute. Currently there is no specific time set aside during the conference for this.

The Committee recommends that a specific, consistent time be set aside during the conference to recognize retirees and that the Membership Committee in conjunction with the BOD be responsible for identifying those to be recognized and for working with the LAC to organize the event.

The Committee further recommends that the BOD consider establishing a reduced membership fee for retirees.

4. Dow AgroSciences Award:

The Committee feels that the description of this award should be modified to make a clearer distinction between it and the Fellowship.

5. Committee Membership (2007):
D. Clements (Past-chair)
M. Upadhyaya
P. Sikkema
D. Bernier
G. Coukell
R. Holm (Chair)

During the year, it became evident that the Committee was not following the by-laws with respect to length of term, recruitment of new members and selection of the Chair. The practice has been to have a committee with six members for six year terms (1 new member per year, recruited by the Chair). The longest serving member of the Committee has acted as Chair. To conform to the by-laws (re-printed below), Clements and Holm will drop off the committee at the end of 2007. The Nominations & Elections Committee was asked to secure replacements who are Dr. Suzanne Warwick and Dr. Russ Hynes.
Based on seniority, D. Bernier and G. Coukell will complete their terms at the end of 2008 and M. Upadhyaya and P. Sikkema will leave the Committee at the end of 2009. At our meeting in Mont Tremblant, M. Upadhyaya tendered his resignation from the Committee as he will likely be on leave and

out of the country at the time of our next meeting. The chair thanked Mahesh for his valuable contributions to the Committee. Mr. Gary Turnbull will serve a two year term as his replacement.

Committee membership for 2008 is:

Name	Contact Info	Term Ends
Danielle Bernier – Chair	Le ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) 200 chemin Ste-Foy,9e etage Quebec, Quebec G1R 4X6 Tel: 418-380-2100 ext.3554 Fax: 418-380-2181 danielle.bernier@mapaq.gouv.qc.ca	Dec 2008
Gary Coukell	ICMS Inc., Box 67, 2375 Saskatchewan Ave.E., Portage la Prairie, Manitoba R1N 3B2 Tel: 204-857-6609 Fax: 204-239-4478 coukell@icms-inc.com	Dec 2008
P. Sikkema–Co-chair	Ridgetown Campus, University of Guelph 120 Main St. E. Ridgetown, ON N0P 2C0 Tel: 519-674-1603 Fax: 519-674-1600 psikkema@ridgetownc.uoguelph.ca	Dec 2009
Gary Turnbull	Dow AgroSciences Canada, Inc., 39 Scurfield Blvd., Winnipeg, MB, R3Y 1G4 (204) 488-5750 gcturnbull@dow.com	Dec 2009
Suzanne Warwick	AAFC Eastern Cereal & Oilseed Research Centre 960 CARLING AVE OTTAWA, ONTARIO K1A 0C6 Telephone: (613) 759-1829 Fax: (613) 759-1701 warwicks@agr.gc.ca	Dec 2010
Russ Hynes	AAFC Saskatoon Research Centre 107 SCIENCE PLACE SASKATOON, SASKATCHEWAN S7N 0X2 Telephone: (306) 956-7638 Fax: (306) 956-7247 hynesr@agr.gc.ca	Dec 2010

It is also noted that the by-laws place responsibility for the Photo Contest on this Committee. However, in recent times at least, the Committee has not been involved in arrangements for the Photo Contest as this has been handled by the Local Arrangements Committee and Brent Wright for many years.

The Committee recommends that the status quo be maintained with respect to the Photo contest.

Committee Membership and Responsibilities (Excerpted from CWSS-SCM By-laws):

Scholarships and Awards Committee:
9.7.1 Members: *The committee is comprised of six (6)members elected at the annual meeting. Candidates for membership on the committee will be nominated by the Nominations and Elections Committee. Additional nominations may be made from the floor of the annual meeting.*

9.7.2 Membership is for three (3) years with the two (2) longest serving members being replaced each year.

9.7.3 Members of the committee will select the Chair and Co-Chair. Normally one of the third year members will serve as Chair and one of the second year members will act as Co-Chair.

9.7.4 Responsibilities

9.7.4.1 Coordinate all tasks required for the annual presentation of all CWSS/SCM Scholarships and Awards, including but not limited to:
Student Scholarships
Industry Travel Awards
Best Poster Competition Awards
Photo Competition
Excellence in Weed Science Award
Outstanding Industry Member Award
Any other awards as may be established.

9.7.4.2 Make recommendations to the CWSS/SCM Board of Directors regarding award terms of reference and administration.

9.7.4.3 Make recommendations to the CWSS/SCM Board of Directors regarding the establishment of new awards, their terms of reference and administration.

9.7.4.4 The Chair of the committee is responsible for organizing the awards presentations at the annual meeting.

Report for Agricultural Institute of Canada – Canadian Journal of Plant Science

David Clements and Paul Cavers
13 November 2007

Promotion of the Biology of Canadian Weeds Series

Stephen Darbyshire, associate editor connected with the sister series in CJPS, Biology of Invasive Alien Plants in Canada, attended a meeting at the Royal Botanical Gardens (Hamilton) on October 26th to give a presentation to "The Ontario Terrestrial Invasive Plants Council" - their inaugural meeting. He took along 140 copies of volume 1 of the compendium books; all of these copies disappeared quickly. Stephen also put out order forms and information about the other volumes as printed from the AIC web site.

Information about the two series has been prepared and posted on the Canadian Weed Science Society – Société canadienne de malherbologie web site http://www.cwss-scm.ca/Biology_of_weeds/index.html with information on the history and status of the series, contribution instructions and publisher information. David Clements and Paul Cavers are preparing a poster to be displayed at the CWSS annual meeting in November 2007 in Mont Tremblant, Quebec.

Funding had been received from the Canadian Food Inspection Agency to pay publication charges of papers in both series; in the past page charges has been a problem for some authors. The contract for the funding ends at the end of March 2008, but there was some hope that it may be renewed.

Recent Accounts Published or *In Press*

Lepidium draba L., *L. chalapense* L., *L. appelianum* Al-Shehbaz (updated).
Francis A. and Warwick S.W. (*accepted*)

Lonicera japonica Thunb. (Account #135)
B. M. H. Larson, P. M. Catling, and G. E. Waldron
Can. J. Plant Sci. **87**: 423–438.

Bromus inermis Leyss. (Account #134)
R. Otfinowski, N. C. Kenkel, and P. M. Catling
Can. J. Plant Sci. **87**: 183–198.

Cuscuta campestris Yuncker, *C. gronovii* Willd. ex Schult., *C. umbrosa* Beyr. Ex Hook., *C. epithymum* (L.) L. and *C. epilinum* Weihe. (Account #132)
M. Costea and F. J. Tardif
Can. J. Plant Sci. **86:** 293-316.

The Biology of Canadian Weeds
Accounts in Preparation, March 2007

Acer negundo L.
Alliaria petiolata (M. Bieb.) Cavara & Grande (update)
Agrostis scabra Willd.
Anthoxanthum odoratum L.
Apera interrupta L.

Apocynum cannabinum L.
Artemesia biennis Willd.
Artemesia stelleriana Besser.
Astragalus miser Douglas
Bidens cernua L., *B. frondosa* L., *B. tripartita* L. & *B. vulgata* Greene
Brassica napus L. & *B. rapa* L.
Calamagrostis canadensis (Michx.) Beauv.
Calystegia sepium L. R.Br.
Capsella bursa-pastoris (L.) Medic.
Cenchrus longispinus (Hack.) Fernald
Cerastium arvense L. & *C. vulgatum* L.
Chaenorrhinum minus (L.) Lange
Chenopodium album L. (update)
Cirsium vulgare (Savi) Ten.
Cornus canadensis L. (update)
Coronopus didymus (L.) J.E.Sm.
Cotoneaster spp.
Crataegus monogyna Jacq. & *C. punctata* Jacq.
Dactylis glomerata L.
Digitaria sanguinalis L. & *D. ischaemum* (Schreb.) Muhl.
Erysimum cheiranthoides L.
Euphorbia esula L. (update)
Festuca arundinacea Schreb.
Galinsoga parviflora Cav. & *G. quadriradiata* Ruiz. & Pavón (update)
Glechoma hederacea L.
Hedera helix L.
Hesperis matronalis L.
Hieracium aurantiacum L. & *H. florentinum* All., *H.x floribundum* Wimm. & Grab. and *H. caespitosum* Dumort
Hieracium pilosella L.
Hordeum vulgare L. (volunteer barley)
Kochia scoparia (L.) Schrad.
Knautia arvensis (L.) Coult.
Lathyrus tuberosus L.
Ledum groenlandicum Oeder
Lolium temulentum L.
Mentha arvensis L.
Mollugo verticillata L.
Muhlenbergia frondosa (Poir.) Fern.
Onopordum acanthium L.
Panicum miliaceum L.
Pastinaca sativa L.
Phalaris arundinacea L.
Polygonum amphibium L. ssp *laevimarginetum*
Polygonum lapathifolium L., *P. pensylvanicum* L. *P. persicaria* L. & *P. scabrum* Moench
Ranunculus acris L.
Rhamnus cathartica L.
Rhamnus frangula L.
Rhus glabra L. & *R. hirta* (L.) Sudw.
Robinia pseudoacacia L.

Rubus discolor Weihe & Ness and *R. laciniatus* Willd.

Salsola kali L. subsp. *ruthenica* (Iljin) Soó
Rumex crispus L. & *R. obtusifolius* L.
Saponaria officinalis L.
Setaria faberi Herrm.
Setaria viridis, S. glauca, S. verticillata (update) (ok'd by Gord Thomas & P. Cavers)
Silene vulgaris (Moench) Garcke
Solanum triflorum Nutt.
Spergula arvensis L.
Stachys palustris L.
Tanacetum vulgare L.
Tussilago farfara L.
Veronica spp

Report for Agricultural Institute of Canada – Canadian Journal of Plant Science

Stephen Darbyshire and Suzanne Warwick
13 November 2007

The Biology of Invasive Alien Plants in Canada

The series was initiated in the Canadian Journal of Plant Science in the fall of 2003, with the Instructions for Preparation of Accounts and the first publication in the series appearing in the Nov. 2003 issue. Suzanne Warwick and Stephen Darbyshire are currently co-associate editors for the series. To date, eight papers have been published, two of which appeared in 2007, with an additional paper accepted for publication. Nine papers are in preparation by authors, but not yet submitted. At least one more submission is expected by the end of the calendar year.

An updateable poster and handout sheet has been prepared to promote the series and presented at two meetings in 2006: Canadian Weed Science Society Victoria, BC, Nov. 2006; and, Weeds Across Borders, Hermosillo, Mexico, May 2006.

Information about the series (and The Biology of Canadian Weeds) has been prepared and posted on the Canadian Weed Science Society – Société canadienne de malherbologie web site http://www.cwss-scm.ca/Biology_of_weeds/index.html with information on the history and status of the series, contribution instructions and publisher information.

PUBLISHED

	Authors
1. *Eriochloa villosa* (Thunb.) Kunth Can. J. Plant Sci. **83**: 987-999. [2003]	Darbyshire et al.
2. *Cynanchum louiseae* (L.) Kartesz & Gandhi and *Cynanchum rossicum* (Klepow) Borhidi Can. J. Plant Sci. **85**: 243-263. [2005]	DiTommaso et al.
3. *Amaranthus tuberculatus* (Moq.) Sauer var. *rudis* (Sauer) Costea & Tardif Can. J. Plant Sci. **85**: 507-522. [2005]	Costea et al.
4. *Heracleum mantegazzianum* Somm. & Levier Can. J. Plant Sci. **86**: 569-589. [2006]	Page et al.
5. *Polygonum cuspidatum* Sieb. & Zucc. Can. J. Plant Sci. **86**: 887-905. [2006]	Barney et al.
6. *Berteroa incana* (L.) DC. Can. J. Plant Sci. **86**: 1297-1309. [2006]	Warwick & Francis
7. *Cabomba caroliana* Gray Can. J. Plant Sci. **87**: 615-638. [2007]	Wilson et al.
8. *Lepidium latifolium* L. Can. J. Plant Sci. **87**: 639-658. [2007]	Francis and Warwick

IN PRESS:

Impatiens glandulifera Am. — Clements et al.

SUBMITTED (IN REVISION):

None current.

ACCOUNTS IN PREPARATION:
SPECIES CURRENTLY ASSIGNED

Ailanthus altissima (Mill.) Swingle
Caragana arborescens Lam.
Daphne laureola L.
Glyceria maxima O.R. Holmberg
Lonicera maackii (Rupr.) Herder
Nymphoides peltata (S. G. Gmel.) Kuntze
Rosa multiflora Thunb.
Tamarix spp.
Trapa natans L.

Publications Director Report – Eric Johnson

The 4th and 5th volumes of Topics in Canadian Weed Science "The first decade of herbicide resistant crops in Canada" and "Invasive plants: Inventories, strategies and action" were published and distributed in the fiscal year. Papers for the 6th Volume "Invasive Weeds" will be submitted soon so publication should not take too long into the new fiscal year.

Book sales for Past Year:
Integrated Weed Management: Explore the Potential: 3 copies
Field Boundary Habitats: Implications for Weed, Insect and Disease Management. Topics in Canadian Weed Science, Volume 1: 11 copies
Weed Management in Transition. Topics in Canadian Weed Science, Volume 2: 5 copies
Soil Residual Herbicides: Science and Management. Topics in Canadian Weed Science, Volume 3: 18 copies
The first decade of herbicide resistant crops in Canada: Topics in Canadian Weed Science, Volume 4: 4 copies.

Calendar sales:
- 34 at the Victoria meeting
- 177 at our offices

Marketing Proposal was distributed but no feedback was received by committee members.

Proposal is attached.

Proposal to Recognize Corporate Sponsorship
Eric Johnson
Publications Director

Background
- Currently the CWSS-SCM membership structure of supporting, sustaining, and corporate memberships is causing confusion, and companies have expressed concern of the value that they receive for their membership;
- Companies would like to be recognized for their total contributions / donations/ sponsorships to CWSS-SCM.

Proposal
- CWSS adopt a sponsorship structure of Platinum, Gold, Silver, and Bronze to replace the supporting, sustaining, and corporate memberships;
- To determine the sponsorship level, we would total the annual contributions from companies to CWSS; however, we will exclude the contributions towards the CropLife Reception.

Sponsorships
- Propose the following structure:
    - Platinum – sponsorship of $3000.00 or higher
    - Gold – sponsorship of $2000.00 to $3000.00
    - Silver – sponsorship of $1000.00 to $2000.00
    - Bronze – sponsorship of $500.00 to $1000.00

The categories would be based on the previous year's donation. Based on last year's (2006) contributions, Dow and BASF would be Platinum sponsors.

What would a company receive?

Platinum sponsorship
- 1individual membership / mailing contact
- 1 free annual meeting registration
- Logo on website front page / Annual meeting folders / Annual meeting signage
- Book purchase deal of 2:1 for gifts or employees: Receive 1 free book for every 2 books purchased (eg, 10 books purchased, receive 5 free ones) to a maximum of 10 free books.
- Free meeting rooms at annual meeting prior to, during, or after conference
- First right of purchase of promotional items (eg. Calendars) for gifts
- Complimentary display area at Annual meeting
- Two guaranteed time slots for presentation during annual meeting program section of your choice

Gold sponsorship
- 1 individual membership / mailing contact
- Logo on website front page / Annual meeting folders / Annual meeting signage
- Book purchase deal of 3:1 for gifts or for employees: receive 1 free book for every 3 books purchased (eg. 9 books purchased, receive 3 free ones) to a maximum of 10 free books.
- Free meeting rooms at annual meeting, prior to, during, or after conference
- Second right of purchase of promotional items (eg. calendars) for gifts
- Complimentary display area at annual meeting
- One guaranteed time slots for presentation during annual meeting session program section of your choice

Silver membership
- 1 individual membership / mailing contact
- Name (no logo) on website front page / annual meeting folders / annual meeting signage

- Book purchase deal of 4:1 for gifts or for employees; receive 1 free book for every 4 books purchased to a maximum of 10 free books.
- Free meeting rooms at annual meeting prior to, during, or after conference
- Complimentary display area at annual meeting

Bronze membership

- 1 individual membership / mailing contact
- Name (no logo) on website front page / annual meeting folders / annual meeting signage
- Book purchase deal of 5:1 for gifts or for employees; receive 1 free book for every 5 books purchased to a maximum of 10 free books
- Free meeting rooms at annual meeting prior to, during, or after conference

The sponsorship program would be administered by the Treasurer of CWSS.

Provincial Reports

2007 Alberta Report: Weed and Weed Management Update

Lisa Raatz [1,2], Dan Cole [1], and Dr. Linda Hall [1,2]
[1] Alberta Agriculture and Food
[2] University of Alberta

Information from the Alberta Weed Advisory Committee Meeting, Nov. 6, 2007.

Weather

Initial moisture conditions in spring 2007 were rated as being excellent. However, much of the province received excess moisture throughout May and coupled with cool conditions, seeding was significantly delayed. Many fields in the Peace Region and Central Alberta were saturated and as much as 15% of the cropping acres in the Peace remained unseeded. Many producers switched to shorter season varieties to deal with the shortened growing season, and in the south many producers were re-seeding because rapid drying had caused poor emergence due to soil crusting. In low-lying areas, excessive moisture caused crop yellowing. Generally crops were 1-2 weeks behind resulting in a shortened herbicide application window. Fall-seeded cereals, pasture, and haylands were in excellent condition. Hailstorms in June and July across the province caused light crop damage, mostly affecting canola. Heat waves in July forced crop development to progress rapidly, however, cereals were showing signs of heat stress and flower blast and pod abortion occurred in canola. Frosts, hail, and cooler, wet weather in August and September delayed crop maturity further and reduced crop quality and yields. Fall seeded crops and hay generally had above average yields, but spring cereals and canola were below average both in yield and quality. Moisture prior to freeze-up would have been welcome through most of the province, although overall moisture conditions were fair to good.

Weed Concerns in 2007

The Ag-Info centre received 371 weed calls from across the province in 2007. Producers called for information about the following weeds in consecutive order based on the volume of calls: Canada thistle, dandelion, scentless chamomile, wild oat, volunteer canola, foxtail barley, quackgrass, alfalfa, common tansy, and narrow-leaved hawk's beard. In forage crops, there were more calls than in previous years about controlling common tansy in pasture lands. There were also calls about orange hawkweed, biennial wormwood, American dragonhead, gumweed, nightshade and one call on Russian olive. The few forage producers calling about American dragonhead were adamant that it is a weed that should take a priority focus in its control. White cockle is still a problem, especially in zero- or minimum-till cropping systems and haylands. There were many requests for weed identification. Overall, there were fewer weed calls than in 2006.

Many of the calls were made by the public to complain about weeds on municipal lands and express concerns over the use of pesticides, particularly in urban areas. The most common "complaints" were calls to diagnose herbicide spray drift. Callers tended to place the blame on herbicide applicators, accusing them of spraying in windy conditions. Concerns about surfactants causing burning injury symptoms on crops were also expressed and as in previous years, there were many calls for advice about cropping restrictions due to herbicide carryover. (Harry Brook, Ag-Info Centre).

Dealers from across the province compiled a list of their most problematic weeds in 2007. Wild buckwheat is still a problem in Roundup Ready canola, particularly when it flushes later in the season. White cockle continues to be a problem in zero-till cropping systems, while annual sow-thistle and narrow-leaved hawk's beard are still an issue in peas. Round-leaved mallow is showing up in central Alberta, possibly coming in hay shipments from the south. Overall, there was poor control of wild oat in peas and Clearfield canola and limited control in wheat with Everest attributed to the wet conditions in June. There was an increase in yellow and orange hawkweed in pastures, and increases of winter annual cleavers and foxtail barley.

There were issues with weed control in Roundup Ready canola crops as well as controlling the volunteers. Dealers faced inquiries about how to control volunteer Roundup Ready canola in a pre-harvest glyphosate application in cereals because the canola is still blooming and can cause harvest and seed storage problems. This issue is still unresolved. Roundup Ready canola volunteers in Roundup Ready canola crops also posed a problem since the plants are maturing at different times. Cross-pollination of Roundup Ready canola with Liberty Link canola resulted in unexpected survival of volunteers in a pre-seed burnoff situation.

Manufacturer herbicide sales programs with seed sales are encouraging the use of herbicides that may not be as effective on some weed spectrums or may not help in delaying weed resistance. (Dennis Prins, Association of Agri-retailers)

From a producer perspective, Canada thistle, foxtail barley, white cockle, common tansy and common burdock are weeds of concern in the Smoky Lake area (John Wozniak, Alberta Barley Commission)

The Association of Alberta Agricultural Fieldmen (AAAF) had weed concerns similar to previous years, but also expressed concerns about a weed new to Ponoka County. A major infestation of yellow hawkweed extending over five townships was discovered. Tall buttercup (*Ranunculus acris*) seems to be aggressive in pastures and is in many municipalities east of Hwy 2 and spreading eastward. Because this weed seems to prefer moist environments, herbicide use is limited and many Agricultural Fieldmen expressed the need for a biocontrol agent on tall buttercup. Despite adequate control measures available within cropping systems, common tansy (*Tanacetum vulgare*) appears to be on the increase and yellow toadflax (*Linaria vulgaris*) continues to be a problem in pastures and roadsides.

Frustrations were expressed that the Province legislates the Weed Control Act, but often fails to comply on both provincially and federally controlled lands. However, the three-year management plan set up with Canadian Pacific Railway in central Alberta appears to be working. (Keith Boras, AAAF)

Food and feed safety continue to be critical issues in the Japanese export market for processed forages where growers are limited in their herbicide choice because of Japanese-imposed "maximum residue limits" (MRL's) in hay. Canada does not have MRL's for single feed (forage) ingredients. The addition of timothy to the Frontline label was selected as a Minor Use Priority in 2007 as florasulam is not currently on the Japanese list of chemicals with specific MRL's. Foxtail barley is of greatest concern for timothy producers, as well as dandelion. Wild oat, volunteer cereal crops, and downy brome are also becoming more problematic. Major troublesome broadleaved weeds include: Canada thistle, dandelion, and sow-thistle. (Tracy Dow, Canadian Hay Association)

The Rangeland Management Branch (RMB) of Sustainable Resource Development (SRD) worked with municipalities on weed contracts to focus on controlling invasive weeds on vacant public lands. Tree and shrub control was the high priority for the associations on northern reserves, and approximately 700 grazing leases were inspected for range health and invasive weed information. RMB together with the Forestry Division is developing an internal Invasive Weed Database to track and map weed occurrences. RMB would like to see the following weeds included under the Weed Control Act: Brown knapweed (*Centaurea jacea*), Downy brome (*Bromus tectorum*), Caraway (*Carum carvi*), Baby's breath (*Gypsophila paniculata*), Absinth (*Artemisia absinthium*), and Common Burdock (*Arctium minus*).

The Forest Management Branch (FRB) surveyed approximately 1500 sites in 2007, most of which had some degree of infestation by invasive species. The most frequent invaders were: scentless chamomile, perennial sow-thistle, and Canada thistle. (Brad Webb, RMB and Mike Undershultz, FMB)

The Alberta Invasive Plants Council (AIPC) has established four working committees: Education, Collaboration, Advisory, and Profile. They are working to publish factsheets for weeds legislated under the Alberta Weed Control Act as well as invasive ornamental plants. They are collaborating with a variety of organizations and publishing newsletters as well as hosting the Weeds Across Borders Conference in May 2008. (Karen Sundquist, AIPC)

Newer weeds

Orange and yellow hawkweeds are continuing to increase and spread in Alberta. (Harry Brook, Ag-Info Centre)

New Weed Management Tools

Dow AgroScience is registering Simplicity (pyroxsulam), a Group 2 herbicide to provide broad spectrum post-emergent control of annual grasses and broadleaves in cereals.

Bayer CropScience is registering Infinity (pyrasulfotole), a Group 27 bleaching herbicide, which will provide broadleaf weed control in cereals.

Lacombe County is involved in the development of a wet blade vegetation control system where herbicide is applied to the cut weed stems while the vegetation is being mowed. It has better public acceptance and reduced drift than spraying.

Minor Use

In 2007, there were several weed-related User Requested Minor Use Label Expansions (URMULE): Poast Ultra for control of grass weeds in Short Rotation Intensive Culture (SRIC) poplar and Spectrum for control of broadleaf weeds in grass seed crops. Several weed related URMULEs were or will soon be submitted: Sencor 75DF for broadleaf weed control in narrow-leaf lupin, Reglone and Assure II in lupin and fababean, and Pursuit Ultra in fababean. (Rudy Esau, Prairie Pesticide Minor Use Consortium)

The Minor Use Pesticides Program in Scott, Saskatchewan conducted 33 field trials in 2007 and has obtained 16 new registrations on 38 different crops for the Prairies since 2002 when the program started. There is new incentive for pesticide companies to support minor uses for new pesticides. Data protection will be extended 1 year for every 3 minor uses obtained to a maximum of 5 years. (Eric Johnson, Agriculture and Agri-Food Canada)

Biological Control

Work has started in Europe to find biological control agents for common tansy. Several potential agents have been collected including a stem-boring moth *Isophrictis striatella*, a leaf-feeding beetle *Cassida stigmatica*, a stem, rosette and flower-head galling midge *Rhopalomyia tanaceticola*, a flea beetle *Longitarsus succineus*, a stem-mining weevil *Microplontus millefolii*, and others. A test plant list has been submitted and research has been initiated to ensure host plant specificity.

Rearing of biological control agents of scentless chamomile, gall midge *Rhopalomyia tripleurospermi* and seed weevil *Omphalapion hookeri* continued. Nine releases of the gall midge and twelve of the seed weevil were made in Alberta and Saskatchewan by McClay Ecoscience.

Establishment of biological control agents of yellow toadflax released in Beaver County were assessed. The root-boring moth *Eteobalea serratella*, released in 1995, was not found in a sample of 40 roots; however, the stem-mining weevil *Mecinus janthinus* is well established at the site. (Dr. Alec McClay, McClay Ecoscience)

Saskatoon is continuing to work with Scotts towards commercialization of their promising bioherbicide, Weed Stop (*Phoma macrostoma*), for control of broadleaf weeds in turfgrass, agroforestry, and agriculture. Their other research priorities focus on developing bioherbicides that have efficacy on green foxtail, wild oat, Canada thistle, dandelion, scentless chamomile, ragweed, goldenrod, chickweed, and kochia. (Dr. Karen Bailey, Agriculture and Agri-Food Canada)

Alberta Weed Control Act

A few changes to the Weed Control Act were approved on November 22, 2007 and are scheduled for passage at the spring 2008 sitting of Legislature. Some of these changes include:
-The weed designations will change from three (Restricted, Noxious, Nuisance) to two (Prohibited noxious and Noxious).
-Weed inspectors will be able to prohibit the movement of items such as gravel or topsoil.
-Concurrent jurisdictions will apply to all municipalities.
-Right of entry for enforcement will be clarified and there will be an entire re-write of the Weed Control Act to provide more clarity.
-Service for notice will change from using registered mail to immediately posting on the property and sending the notice through the regular mail stream.
-Seed cleaning plant licensing will be broadened to include leases and rentals.
(Paul LaFlamme, Alberta Agriculture and Food)

Upcoming Meetings and Conferences

-Weeds Across Borders Biannual Meeting and Conference, May 27-30, 2008 in Banff, Alberta. Hosted in part by the Alberta Invasive Plants Council (www.invasiveplants.ab.ca)
-2008 International Weed Science Congress, Canada. June 23-27, 2008 in Vancouver, British Columbia. (http://iws.ucdavis.edu/5intlweedcong.htm)

Research Priorities

Dr. Linda Hall, as AWAC chairperson, sent a letter to the Alberta Crop Industry Development fund (ACIDF) outlining AWAC's research priorities selected by members in 2006: Biology and agro-ecology of white cockle; biology and agro-ecology of foxtail barley; risk assessment of invasive potential of salt cedar; risk assessment of glyphosate resistance in weeds; and weed survey in Alberta. Research priorities for 2007/08 are currently being determined.

2007 Report to the CWSS
New Brunswick

Prepared by Gavin Graham, IPM Weed Management Officer
New Brunswick Department of Agriculture and Aquaculture

Season Summary

The winter of 2007 was generally mild with adequate snow cover, resulting in good overwintering of crops. Early spring temperatures were warmer than normal, although things cooled off and became wetter at the end of May. Weed pressure was considered average throughout the province. Weed control measures were assisted by the weather, as conditions were good for most application timings. Moisture levels were adequate all season throughout the province except for the Eastern shore where moisture levels were low at the start of the season. In general, dry conditions in the late summer and fall aided harvesting procedures for many crops. Overall, weather conditions were good for most New Brunswick crops.

Weed Problems Reported in 2007

Wild blueberry:	sheep sorrel, lambkill, rhodora, poverty oat grass, tickle grass, hawkweed, rough cinquefoil, yellow loosestrife, Canada fleabane, hair fescue, bracken fern, lamb’s quarters, goldenrods, bunchberry, vetch, witch grass
Cranberry:	vetch, goldenrods, willows, other tree seedlings, sedges, rushes, grasses, five fingered cinquefoil, rough cinquefoil, buttercup, sheep sorrel
Strawberries:	groundsel, toadflax, rough cinquefoil, five-fingered cinquefoil, stitchwort, sheep sorrel, field pansy, buttercup, sedges, bladder campion, cleavers, low cudweed, sow thistle, willowherb
Vegetables:	quackgrass, barnyard grass, wild radish, shepherd’s purse, purslane, smartweed, hempnettle, hairy nightshade, Angelica
Corn:	quackgrass, triazine resistant weeds, red root pigweed, lambs quarters
Cereals:	quackgrass, cleavers, hempnettle, barnyard grass
Alfalfa:	dandelion, quackgrass, corn spurry, hempnettle
Pastures/hay:	smooth bedstraw, goldenrod, thistles, dandelion, evening primrose, clovers
Potatoes:	pigweeds, sow thistle, chickweed, marsh hedgenettle, goldenrods

Weeds on the Increase

- Smooth bedstraw, common groundsel, pigweeds, triazine resistant weeds, Perennial sow thistle, mallow, marsh hedge nettle, field violet, cleavers, sheep sorrel, evening primrose, curled dock, toadflax, shepherd’s purse, barnyard grass, Canada fleabane, rough cinquefoil

Research Trials

Wild Blueberries

- Evaluation of fall applications of tribenuron after harvest for control of bunchberry
- Product screening for herbicide options in the sprout year for lambs quarters control
- Screening for grass herbicides in the spring of the sprout year
- Evaluation of fall applied herbicides followed by spring hexazinone
- Evaluation of fall applications of Group 4 products with tank mixes of 2,4-D ester
- Effect of fall herbicide and mowing timing on lambkill and rhodora

- Examination of herbicides after blueberry pruning for sheep sorrel control
- Examination of sprout and crop year sheep sorrel control options
- Control options for ticklegrass in the crop year
- Group 27 herbicide screening
- Evaluation of nitrogen fertilizer effect on the growth of lambs quarters
- NSAC Weed Biology Lab – blueberry weed control research
- NSAC Vegetation Management Research Program – blueberry weed control research

Strawberries

- Evaluation of products for groundsel control
- Product screening for cleavers control
- Evaluation of sulfentrazone weed control spectrum

Cranberries

- Evaluation of timings and repeated mesotrione applications
- Evaluation of acetic acid injections and broadcast application for organic weed control
- NSAC Weed Biology Lab - cranberry weed control research

Field Corn

- Evaluation of products and timings for RR corn

Forage

- Evaluation of products for control of smooth bedstraw

Minor Use Applications

- Emergency registration of Callisto for control of lambs quarters in wild blueberries
- Emergency registration of Callisto for control of labeled weeds in cranberry

Crops in which more research is required

Vegetables: lack of herbicide options, evaluation of corn gluten mulch needed
Cranberries: lack of herbicide options
Strawberries: lack of post emergent weed control options, weed removal from straw mulch
Wild Blueberry and Cranberry: lack of organic control methods
Alfalfa: lack of herbicide options
Potatoes: lack of post emergent weed control options
Grain: grass control product evaluation
Invasive plants: General control methods

Issues and Concerns

- Lack of biopesticide and reduced risk product availability for weed control
- Loss of herbicide registrations with no viable replacements
- Resistance to triazine herbicides used in potatoes, corn and blueberries
- Weed seed movement on blueberry harvesters
- Potential role of fertilizer and harvesters in prevalence of weeds in wild blueberries
- Organic weed control methods for wild blueberry and cranberry (acetic acid)

Extension

- IPM training sessions were developed for apple, blueberry, corn, strawberry, forages, potato, vegetable, raspberry and cranberry. Grain, potato and wild blueberry weed control guides are being updated.

- Numerous requests for information on weeds and their control were answered by telephone, fax, e-mail, letters and farm visits. Weed control information was also presented in various newsletters. Presentations at numerous meetings were also given.
- Through the weed diagnostic lab 87 weed species were sent in for identification. Approximately 200 weed identifications were performed in the field. Herbicide injury was also diagnosed on 3 samples.
- New factsheets have been made for the Department website, along with planned revisions to additional website material. Bilingual Crop Updates were posted to the website every two weeks during the growing season, allowing timely access to information by growers and industry personnel. An Integrated Pest Management Image Database is also close to completion and will be available on the Department website when complete: http://www.gnb.ca/0027/index.htm

2007 Report to the CWSS
Nova Scotia

Prepared by Joe Calder, Chief Weed Inspector, Weed Control Act,
Nova Scotia Department of Agriculture

The mild winter of 2006/2007, and in general, a favorable growing season resulted in good cropping conditions and yields of most crops with the exception of wild blueberries, the province's most important horticultural crop. In certain areas there was some winter damage but more important the cool, wet pollination period was the biggest factor. Weed pressure for the large part was average.

In September, a workshop titled Atlantic Environment and Invasive Weeds: Who, What, Where and Why-"Looking into collaborative possibilities for managing invasive weeds" was held in Truro and attracted more than eighty participants from across Atlantic Canada. Presenters representing the four Atlantic Provinces discussed the current status of invasive weeds and various projects in their respective provinces. There was also a presentation about the federal response with respect to invasive plants. Presentations on the Invasive Plant Atlas of New England and the Invasive Plant Council of British Columbia by Gail Wallin were very informative. Ms. Wallin also facilitated a session on possible collaboration among the four provinces in regard to the invasive species threat. The outcome of this session was the creation of a framework for provincial collaboration as well as the creation of an Atlantic network. It was decided to focus the work on a provincial level and to create a regional network to compliment it.

Annual Business Meeting Minutes

CWSS-SCM
Annual Business Meeting
Fairmont Tremblant, Mont Tremblant, QC
Thursday Nov 29, 2007

Called to order: 08:20

1.0 Approval of Agenda

Moved: Jeff Bertholet
Seconded: Linda Hall
Carried

2.0 Acceptance of 2006 Minutes

Moved: Bob Blackshaw
Seconded: Clarence Swanton
Carried

3.0 President's Report (Juras)

3.1 Retirement planning

For 2008, Board proposal is to post a retirement corner on the website to make the process more systematic and comprehensive; individuals can post a name to be honored by a plaque at their institution and at the annual meeting if they attend.

3.2 External communication

IWSC meeting (Blackshaw)

Next June in Vancouver, hosted by WSSA and CWSS. June 23-27, Westin Bayshore Hotel. Also accommodation at University of BC; field tour on Wed (presentations Mon,Tue, Thur, Fri). Need volunteers to ride a bus to help out in the tour. Abstract submission open; closes mid-Jan (as poster, but some will be oral presentations). Registration not yet open. (US$450 early registration) –tour included in registration. Pending link on CWSS web site. Al Hamill will lead fundraising committee.

PMRA, CFIA, CLC, AAFC Policy

Opportunity for these organizations to update the membership at the annual meeting on their activities, e.g., Special topics section.

3.3 Internal Communication

Grad student meet and greet sponsored this year by CWSS-SCM on Monday evening. Good feedback received. Plan written correspondence to grad student rep at each university, etc. Will continue to provide opportunities for grad students, such as possibly posting resumes on CWSS website, etc.
Corporate sponsorship: platinum, gold, silver, bronze levels being finalized to increase value and recognition of our corporate sponsors.

Move to accept report: Len Juras
Seconded: Bill May
Carried

4.0 1st Vice-President's Report (Swanton)

Described recent changes in annual meeting format. Books based on symposia presentations has given the members value and the CWSS-SCM international recognition. Concurrent sections – 7; 6 offered this year. Working groups can meet outside of the annual meeting –rooms can be made available. Role of professional training –build into the annual meeting (beginning or end of annual meeting). Feedback welcome from membership, e.g., statistics, molecular biology. Appreciate the work of the section organizers. Feedback from membership: Would like to see better integration of posters in the sections –block of time for poster presenters to briefly talk to them; multivariate stats; encourage USA member participation (WSSA is reaching out to regional societies, such as joint meeting with SWSS next year; (hurdle is crossing border though)

Moved to accept report: Clarence Swanton

Seconded: Gary Turnball

Carried.

5.0 2nd Vice-President's Report (Wolf)

5.1 Awards & Scholarships Committee

Thanked Rick Holm (Chair). Need to advance deadlines, e.g. translation, busy with field work – move at least some deadlines to spring.

Swanton: suggested separate grad student award to Masters and PhD students. Or two prizes for 1st and 2nd if many students (suggestions to committee).

5.2 Membership Committee

In transition. Anne Legere to work with Leslie Huffman for outreach to try to increase membership. Thanked Leslie.

5.3 Reports and Publications Committee

4th and 5th volumes distributed this year. Copies of books given free to graduate students. 34 calendars sold at Victoria meeting, another 177 at the office.

Marketing Committee –revamping corporate sponsorship guidelines; long-term strategy being formulated.

5.4 Database Committee

Dave Blatta, Chair. Need to update database –post submissions and encourage submissions. About $350 per year to maintain it. Feedback from membership: should encourage submissions; interact with Pest Management Centre; partner with minor use to get them to help sponsor; need to increase awareness among membership; not vested interest in submitters to submit data since rarely use the data; about 30 reports submitted each year; reminders from committee to membership (particularly those who generate data) to encourage submissions. Consensus of value of database and charged the committee to move forward on these issues.

History and Archives Committee – Bill Vanden Born retired; will pass along information. Consensus to keep this committee.

Biol Cdn Weeds –no report from David Clements

5.5 Resolutions Committee

Board discussed the fate of the Committee; felt it needed to be retained.

Moved to accept report: Tom Wolf
Seconded: Rick Holm
Carried.

6.0 Resolutions (Hare)

1st call, 2nd call, 3rd call –no new resolutions (closed).

Resolution on thanking the Mont Tremblant Local Arrangements Committee:
Whereas the 61st CWSS-SCM meeting in Mont Tremblant, QC has been an outstanding success in
content, organization, location, facility, and industry support: Be it resolved that the membership of
CWSS-SCM extend its heartfelt thanks and gratitiude to Diane Lyse Benoit and the Local Arrangements
Committee for their hard work and dedication.
Moved: Len Juras
Seconded: Don Hare
Acceptance by applause from general membership
Carried.
Gift was presented to Diane Benoit from the President.

7.0 Treasurer's Report (Cowbrough)

Fiscal year: Oct 1-Sept 30; Audit completed; Provided financial report; net loss of $500. Goal is to
provide surplus to provide 2 yr of operating –somewhat short of that goal at 1.2 yr. Discussed
proposed 2007-08 budget: $70,000 total. Operating expenses increasing, therefore need to increase
revenue in the future.

Move to accept report: Mike Cowbrough
Seconded: Neil Harker
Carried.

8.0 Nominations Committee Report (Legere)

8.1 Elections

Treasurer: Mike Cowbrough (acclaimed for 2nd term)
New 2nd VP: Sue Boyetchko
MAL-West: Rob Gulden
LAC 2009: Jerry Ivany
Move to accept report: Anne Legere
Seconded: David Clements
Carried.

9.0 Local Arrangements Committee 2007 (Benoit)

202 attending. 22 students registered, 40+ walk-ins. Thanked LAC members.

10.0 Local Arrangements Committee 2008 (Patzer)

2008: Nov 24-26, Banff Springs Hotel, Banff, AB. Chair: Paul Thiel. Listed other members on the committee.

11.0 Other Business (Juras)

11.1 Renewal of Exe. Assistant Contract:

Juras confirmed renewal of Daniel Cloutier’s contracdt. Thanked Daniel for his efforts this past year.

12.0 Installation of New President

Len Juras wished Clarence Swanton all the best. Clarence presented Len with a plaque.

Adjournment: 10:05 am

SALON DE L'AGRICULTURE

Le Salon de l'agriculture a lieu les 15-16-17 janvier 2008.

Les coordonnées du contact du Salon sont :

Salon de l'Agriculture
Donald Côté
2200, rue Pratte bur. 120,
St-Hyacinthe, QC J2S 4B6

Tél : 450-771-1226
Fax : 450-771-6073

Société canadienne de malherbologie
Canadian Weed Science Society

61ième Réunion annuelle / 61st Annual Meeting

Du 27 au 29 novembre 2007 / November 27 - 29 2007

Fairmont Tremblant, Mont-Tremblant, QC

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